The Chemical Age

A Weekly Journal Devoted to Industrial and Engineering Chemistry

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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Successful Chemical Engineers

THE chemical engineers, who met last week for their annual meeting, accompanied by papers and discussions, had every reason to look back with satisfaction on the amazing progress of the Institution since its establishment a few years ago, and Mr. J. Arthur Reavell, in particular, may contemplate with nothing but pleasure his occupancy of the office of president. Mr. Reavell has brought life and initiative into all he has done during his presidency, and he will be able to survey his two years of office without any sort of regret or qualification. Mr. W. A. S. Calder, who succeeds him, is no new figure to chemists or chemical engineers. He is essentially an organiser, as his work in connection with the annual meeting of the Society of Chemical Industry in Birmingham showed, and under his rule one may confidently look for further progress and for the maintenance of the happy and united spirit that has always distinguished the Institution and, indeed, its associate Group. This year's gatherings ended on a high note with the annual dinner, at which there were several distinguished guests—Lord Rayleigh, himself a scientist who worthily bears his father's name; Sir Ernest Benn, who delighted the company with a characteristically clever and suggestive talk on economy; Sir Harold Hartley, representing the application of science to industry; Dr. Ormandy, who supplied a blend of serious thought and philosophy with the playful humour one expects from him; and several others. There was but one thought in the minds of all at the close—the chemical engineers know how to do these things remarkably well.

Industrial Solvents

WE are glad to be able to assure our readers, who may have seen the somewhat lurid accounts of a fire that occurred on Friday night, March 6, at the works of British Industrial Solvents, Ltd., at Salt End, Hull, that the damage is nothing like so serious as they might have assumed. The fire, it is satisfactory to learn, was confined to the acetic acid storage section of these great works, which were fully described and illustrated in a recent issue of THE CHEMICAL AGE, and, what is particularly important, none of the producing units was affected. There was no explosion and no one was injured. Production in all sections is continuing normally. While the fire was, of course, regrettable, it is satisfactory to know that it was confined within the limits mentioned.

Potash Salts from Leucite

BARON GIAN ALBERTO BLANC, Professor of Geochemistry in the University of Rome, has, during the last twelve years, successfully attacked the problem of extracting alumina and potash salts from leucite, a mineral consisting of a silicate of alumina and potash which, hitherto, was considered worthless and which exists in very considerable amounts in the volcanic rocks of Central Italy. In the course of a public lecture before the Institution of Chemical Engineers at the Institution of Civil Engineers on Thursday, Baron Blanc indicated that the first problem with which he was confronted was to find a practical means of separating the alumina and the potash from the silica. This was solved by a new method of attack of the silicate by acids, which allowed an easy and complete elimination of the colloidal silica from the solution.

Some years ago Professor J. W. Hinchley directed the attention of the English technical world to this process, and it is at present used in England by Peter Spence and Sons for the manufacture of alum by the treatment of leucite with sulphuric acid. The problem of separating the salts obtained by the acid treatment so as to produce the potash as a fertiliser and the alumina for metallurgical and chemical work was then attacked. Finally, by thermal decomposition of the aluminium salt, a new type of chemically active aluminium oxide was obtained, which has proved much more suitable for the production of aluminium than the aluminium oxide obtained through calcination of the hydrate.

One of the characteristic features of the Blanc

process is that it requires only a very limited amount of fuel. A large plant for the treatment of one hundred metric tons of leucite per day is now being completed at Aurelia, near Rome, and will soon be working. The supply of leucite of which Italy can dispose is calculated in milliards of tons. One can easily understand the great interest with which Italy is considering the development of this new industry, which will give that country a prominent position in the world market of aluminium and potash salts.

Apples Be Ripe

We all eat apples in this generation; the apple loft, if we live in the country and possess one, will last us till nearly March, and there is always the fruiterer when it is empty. He will not fail us: apples from Australia, from South Africa, from America, and home-grown apples, from cold storage in March, come each in their turn upon his shelves—for us, the consumers, apples are always ripe.

The man in the street vaguely knows that this plentitude is largely brought about by "cold storage" which has made sea-borne commerce in fruit possible; few stop to think of the science of apple storage, which is indeed of such importance that it has a Low Temperature Research Station all to itself at Cambridge under the auspices of the D.S.I.R. The apple when plucked from the tree is still alive; it goes on respiring, consuming oxygen, giving off carbon dioxide, evolving heat, destroying sugars and acids. When stored in a ship's hold, after it has been cooled to just above the freezing point, the activity lessens, it is true, but it continues respiring and giving out heat. Indeed, the heat generated in this way is three or four times as much as that which leaks into the chamber through the insulated walls. The refrigerating plant must be powerful enough to overcome this heat; if not, a vicious circle of events ensues, for the temperature rises, the rate of respiration increases, and still more heat is liberated. The whole cargo will very quickly spoil—a costly matter, for the losses of Australian apples in 1922, before such questions were understood, reached a total of £250,000! Fortunately, the apple is one of the least active of the fruits as regards respiration, some of the soft fruits being four or five times as active. An even temperature must be kept throughout the stack of fruit; powerful fans, a rapid air change, and other precautions are necessary. The apples are alive; they resent silent, airless rooms; in the refrigerator as on the tree they must have the wind in their face.

Success has attended the efforts to retard the maturity of apples by keeping them in an atmosphere rich in carbon dioxide. The conditions have had to be carefully worked out; they involve a temperature around 41° F. in a gas containing 10 to 15 per cent. of CO_2 and 10 per cent. of oxygen. An excess of CO_2 kills the fruit. The apples come out with their dark green colour retained, whereas in the refrigeration chamber they go yellow. For home-grown fruit the process has great potentialities—they have been kept 40 weeks in such manner.

It would be a great advantage to jam makers if the soft fruits could be similarly stored, so that the jam-making season could be prolonged over several months instead of compressed into a short campaign. Cold storage of soft fruits is costly and difficult, chemical treatment is not to be encouraged, but there appears a hope that something may be done with dry ice. With fruit, vegetables, fish, and meat alike, the problem is the same—how to suspend animation; to solve it the chemist must become animated!

Books Received

Synthetic Inorganic Chemistry. By Arthur A. Blanchard and Joseph W. Phelan. London: Chapman and Hall, Ltd. Pp. 352. 15s.

The Investigation of Atmospheric Pollution. Report for the year ended March 31, 1930. London: H.M. Stationery Office. Pp. 74. 4s.

Dizionario di Merceologia e di Chimica Applicata. Vol. III. Milan: Ulrico Hoepli. Pp. 1043. L. 60.

Torricelli Contra Mundum. By Frank I. Teed. London: H. K. Lewis and Co., Ltd. Pp. 80. 5s.

Report of the Department of Scientific and Industrial Research, for the Year 1929-30. London: H.M. Stationery Office. Pp. 224. 3s. 6d.

The Chemical Technology of Steam-raising Plant. By Henry Norman Bassett. London: Edward Arnold and Co. Pp. 240. 12s. 6d.

Annual Reports of the Society of Chemical Industry on the Progress of Applied Chemistry, 1930. Vol. XV. London: Society of Chemical Industry. Pp. 758. 7s. 6d. to members, 12s. 6d. non-members.

The Chemical Manufacturers' Directory of England, Wales and Scotland, 1931. London: Simpkin Marshall, Ltd. Pp. 204. 4s. 6d.

The Calendar

Mar.		
16	Institute of Chemistry and Society of Chemical Industry (Edinburgh Sections): "Invention in Chemical Industry." Dr. H. Hepworth. 7.30 p.m.	36, York Place, Edinburgh.
17	Mineralogical Society. 5.30 p.m.	London.
17	Institute of Metals (Birmingham Section): "The Metallurgy of Some of the Rarer Metals." C. J. Smithells. 7 p.m.	Chamber of Commerce, New Street, Birmingham.
17	British Association of Chemists (Manchester Section): "Atoms and Electrons." Sir J. Joseph Thomson. 4 p.m.	Athenæum, Manchester.
18	Society of Glass Technology.	Stourbridge.
18	Electroplaters' and Depositors' Technical Society: "Some Investigations in Copper Deposition." A. W. Hothersall. 8.15 p.m.	Northampton Polytechnic Institute, Clerkenwell, London.
19	Chemical Society. 8 p.m.	Burlington House, Piccadilly, London.
18	British Association of Chemists (Manchester Section): Annual Dinner, 6.30 p.m.	Engineers' Club, Albert Square, Manchester.
19	Society of Dyers and Colourists (West Riding Section): "The Absorption of Dyes by Artificial Silks as Affected by their Physical State." A. J. Hall.	Bradford.
20	Physical Society: Annual General Meeting. 5 p.m.	Imperial College of Science, South Kensington, London.
20	Society of Chemical Industry (Newcastle Section): "Pyrex Glass, its Properties and Applications." H. W. Howes. 7.30 p.m.	Armstrong College, Newcastle-on-Tyne.
20	Society of Dyers and Colourists (London Section): "Spray Dyeing." Captain Whiteman. 6.45 p.m.	Dyers' Hall, London.
21	British Association of Chemists (London Section). Dinner, 6.30 p.m.	First Avenue Hotel, Holborn, London.
23	Society of Chemical Industry (Yorkshire Section): Annual General Meeting. A Discussion on the Activities of the Society opened by H. J. Pooley.	University, Leeds.

Caustic Soda on Cellulose

A Study of its Action

A JOINT meeting of the Manchester and Liverpool Sections of the Society of Chemical Industry was held in Manchester on Friday, March 6, Dr. R. H. Pickard being in the chair.

A paper on "The action of caustic soda on cellulose" was read by Mr. S. M. Neale, M.Sc., Lecturer in Cellulose Chemistry in the University of Manchester and in the College of Technology. Mr. Neale said that the subject of his paper, from the technical point of view, might be classified under two headings corresponding to the two main industrial processes in which caustic soda acted on cellulose. The first was essentially a cleansing process in which natural celluloses were boiled with dilute alkali, in the absence of air, in order to remove impurities. As a result of such treatment no apparent change occurred in the cellulose itself, save only that it yielded a less viscous solution in cuprammonium hydroxide as the severity of the boil was increased.

The second type of process depended on the swelling of cellulose which took place in concentrated alkali solutions at ordinary temperature. Such solutions were employed in the mercerisation of cotton yarns or fabrics, yielding a product which had an enhanced lustre and other desirable textile qualities.

The paper dealt only, and in restricted fashion, with this latter aspect of the question—the action of moderately concentrated alkali at ordinary temperature. The development of the process of mercerisation and scientific work on the subject up to 1922 had been very adequately treated by Clibbens in a summary of the literature published in 1923.

A Recent Theory of Swelling

A recent theory of the swelling action of concentrated alkalis assigned, as the primary cause, salt formation, as a result of which a concentration of ions occurred, which led to swelling by osmosis or movement of water into the more "concentrated" phase. Cellulose that had been subjected to such swelling action appeared to be in a more reactive state than the original material, but this type of change "activation" was quite distinct from the "degradation" effected by acids or oxidising agents, which led to permanent loss of strength and developed new chemical properties—such as reducing power—in the material. The "activation" of cellulose resulting from pre-treatment with caustic soda might be estimated by its moisture absorption, its rate of destruction by acids or by alkaline hypobromite, or by the absorption of alkalis from dilute solution. These tests, however, did not ascribe the same activation ratio to any one sample. The technical importance of the state of activation of cellulose lay in the fact that it determined the amount of absorption of dyestuffs by such materials as rayon and mercerised cotton.

Effects on Lustre and Handle

It was probable that qualities of textile importance such as lustre and handle of mercerised yarns were in some way related to the swelling and activation of the cellulose, but the relation was not simple and was not yet understood. In the manufacture of rayon, which could be regarded as a mercerisation process in which complete dissolution was substituted for mere swelling of the cellulose, the difficulty of obtaining a product of uniform affinity for dyestuffs was well known, and was more severe than the corresponding difficulty in the case of mercerised cotton. There was little quantitative knowledge as to how the pre-treatment of cellulose and its state of activation as measured in various ways were related to the absorption of direct dyestuffs, probably on account of the lack of an easy and accurate method of determining the latter quantitatively. It was probable, however, that the irregular dyeing of rayon was to be attributed rather to unequal rates of diffusion of the dyestuff through the cellulose than to differences in the ultimate amount of dyestuff when dyeing was continued until equilibrium was reached.

The difficulties that arose in practice showed that cellulose, when activated by swelling in mercerising alkali or by dissolution in a solvent, was in a state of extreme sensitivity, so that the properties of the ultimate product might be effected by the slightest variations in technique.

An interesting discussion followed the reading of the paper, and the proceedings closed with a vote of thanks to Mr. Neale.

Safety First at Night

To the Editor of THE CHEMICAL AGE.

SIR,—The fact that nearly twice as many street accidents to pedestrians occur after dark as in daylight forces one to the conclusion that bad street-lighting must be held responsible for the steadily increasing toll of life on the roads at night.

South London has set a notable example by adopting centrally-suspended high-pressure gas lamps and, although no official figures are available, yet it is known that there has been a decline in the number of accidents in districts thus illuminated. At a Lewisham inquest a few days ago, a motorist explained that an accident in which a child was killed occurred at Loampit Hill. Drivers familiar with the district will know that it is at the top of the hill that the system of centrally-suspended high-pressure gas lamps begins, but where the accident occurred alternate electric lamps are placed at the sides of the road. He gave it as his opinion that there would have been no collision had the lighting at this spot, the foot of the hill, been better.

The effect of the "staggered" lamps is to make circles of light which leave the rest of the road comparatively dark. Centrally-suspended overhead high-pressure lamps are being installed in several of the South London boroughs, and I would suggest that this effort to standardise street-lighting on modern scientific lines should be carefully watched by local authorities who, after all, are morally responsible for the safety of citizens in their districts.—I am, etc.,

W. J. LIBERTY,
Late Lighting Superintendent to the City of London.

64, Victoria Street, S.W.1.
March 4, 1931.

Chartered Chemists

[*To the Editor of* THE CHEMICAL AGE.]

SIR,—As an old member of the Institute of Chemistry, and one who has the interests of that institution at heart, I should like to add my support to those who believe that it would be a retrograde step to add the word "chartered" to the word chemist, when the chemist is also a Fellow or an Associate of the Institute. A few years ago I protested, in your columns, against the professionalisation of science. This goes, somehow, with what has been termed "five-fingered" research. Everyone who counts knows that a chemist is a chemist, and not a pharmacist; and in my opinion it would not take many years to get all pharmacists to agree to drop the use of the term chemist on their shops, and announce themselves as pharmacists. Where they are also chemists this might be announced only on their private or side doors. If a chartered chemist, why not a chartered cash chemist? Where is this kind of thing going to stop?—Yours, etc.,

March 9, 1931. W. P. DREAPER.

Death of Sir Alfred Robbins

MANY of our readers will share the feelings of personal loss which comes to us of THE CHEMICAL AGE in the death of Sir Alfred Robbins. The distinguished father of the Deputy Chairman of Benn Brothers, Ltd., had been one of the mainstays of British journalism for full sixty years. He had occupied every position of honour open to a journalist in the Institute of Journalists, the Institute Orphan Fund, the Newspaper Press Fund and the Parliamentary Lobby Committee. Sir Alfred Robbins was for many years one of the most charming and erudite exponents of Dickens, and he added to the wide interests of a dramatist, a critic, and a political author, a lifelong devotion to Freemasonry. He was President of the Board of General Purposes of the Grand Lodge of England from 1913, and on behalf of the Grand Lodge he visited the United States, the Argentine, Uruguay, and Brazil. The loss of Sir Alfred causes a wide gap in the all too thin ranks of traditional British journalism.

Fire at Industrial Solvents Works

A FIRE broke out on the night of Friday, March 6, in the acetic acid storage section of the factory of British Industrial Solvents, Ltd., at Salt End, Hull. The fire was confined to the storage tanks of acetic acid and none of the producing units was affected. There was no explosion and no one was injured. The firm announce that production in all sections is continuing normally.

The Chemistry and Metallurgy of Beryllium

By G. Malcolm Dyson, Ph.D., A.I.C.

THE revolution in the composition of light alloys which was prophesied at the first large scale extraction of beryllium has not yet taken place; and, in spite of the promises made on behalf of this metal, it has not yet taken that place in metallurgical practice that was expected of it. The purpose, therefore, of this article is to summarise the known data on beryllium and to examine the various possibilities of its application. Much progress has been made in recent years with regard to the winning of beryllium ore, and in the extraction of the metal, and, according to quotations given in the *Metallbörse*, its price has dropped from 1,800 marks/kilogram to 440 marks. It can be readily appreciated that such a price drop can only be the forerunner of further reductions in cost, but it is doubtful whether its price will fall to anything like that associated with aluminium.

Occurrence of Ores

The mere mention of "beryl" implies that the mineral has been known since the early history of man. The golden beryl has been valued as a semi-precious stone, as also has the pale green aquamarine, while the emerald, which owes its dark green colour to a trace of chromium oxide has been valued from the earliest times as a precious stone. Biblical references to beryl and emerald are common, and also in the early classical writers. Theophrastus mentions emerald, as also does Pliny, who remarks:—

"There is no green in existence of a more intense colour than this, and besides, of all the precious stones, this is the only one which feeds the sight without satiation."

Chemically speaking, beryl is the double silicate of aluminium and beryllium, and occurs in hexagonal crystals, which the mineralogist Haüy pointed out are the same crystalline form as emerald. This investigator invited Vauquelin to analyse the mineral, and the latter found that a new earth was present to which the name "terre du béril" was given. This was first communicated to the French journals, and the editor of the *Annales* suggested the name "glucine" for the new earth, on account of the sweet taste of its salts. It was pointed out by Klaproth that the new salts were not by any means unique in their sweet taste, and ever since there has been a mild controversy as to the name of the new earth, and later of the metal derived from it. Consensus of opinion has gradually grown to favour "beryllium," and the majority of recent investigators have (in spite of learned societies) used this term. Gmelin referred to the oxide as "Süsserde," but this name has not been perpetuated. Beryl is moderately widespread in nature, but although large masses (2,900 lb. was the weight of one) have been found, they are not common, and the mineral is usually associated with other and less valuable minerals. It contains from 9 to 16 per cent. of beryllium oxide. The table below gives the more common minerals which also contain beryllium, together with the percentage of the oxide contained:—

Mineral.	Formula.	BeO.
Euclase	$BeHAlSiO_5$	17–22
Phenacite	Be_2SiO_4	44–46
Betrandite	$Be_2(BeOH)_2.Si_2O_7$	40–43
Epididymite	$HNaBeSi_3O_8$	10–13
Chrysoberyl	$Be(AlO_2)_2$	19–20
(Cats-eye is a wavy variety of the latter.)		
Hambergite	$BeOH.BeBO_3$	50–53

It will readily be appreciated that these minerals are much less common than beryl itself, so that beryl is the main commercial source of the metal. The principal difficulty is the separation of aluminium from beryllium.

Purification of Ores

Processes for the extraction of beryllium oxide from beryl must be designed with the separation from aluminium in mind. Thus, one process suggests the fusion with calcium carbide and subsequent treatment with hydrofluoric acid and sulphuric acid; a more orthodox treatment is to fuse the powdered beryl with twice its weight of potassium carbonate, by which means the aluminium and beryllium are converted into their carbonates. The cooled melt is treated with sulphuric acid and the mixture evaporated until the acid begins to fume strongly. If the solution is diluted with water at this stage the silica will have been rendered insoluble and may be filtered off. The clear solution is evaporated to a small bulk, when the aluminium separates almost completely on cooling as potash alum. The beryllium in the mother liquor is separated from the iron and aluminium also present, by the addition of ammonium carbonate which precipitates the two latter, leaving the beryllium in solution. The latter can be precipitated as the basic carbonate by boiling the solution. Alternatively, the solution after the separation of the alum may be treated with sodium bicarbonate, which is also capable of precipitating the iron and aluminium, leaving the beryllium in solution. The precipitation of beryllium carbonate is then effected by blowing live steam through the solution. Another method which has been proposed is to heat the powdered beryl in a current of phosgene, the metals being converted into their chlorides which sublime. This separates the metals from the siliceous residue, and they may then be separated by the carbonate process just referred to.

One of the methods which has several attractive commercial aspects is that in which the powdered beryl is heated with six times its weight of acid ammonium fluoride for ten to twelve hours at a temperature just below a medium red heat. The metals present are converted into their fluorides and the silica is partially removed. Extraction of the melt with water results in the aluminium fluoride, which is insoluble in water, being completely separated from the beryllium fluoride, which passes into the water. A certain amount of iron fluoride also passes into solution, but where this is only small in quantity it does not seriously interfere with subsequent operations, and may be ignored. The solution containing the soluble fluorides may be evaporated and directly utilised for the preparation of beryllium.

Preparation of the Metal

Although Wöhler, a little over a hundred years ago, prepared small scales of metallic beryllium by the decomposition of the halides with potassium, the only suitable method for large scale production of beryllium is the electrolysis of a suitable salt. The drawback to the isolation of beryllium at a high temperature is the fact that it has an almost extraordinary affinity for oxygen, burning in that element as easily as magnesium. The problem of prime importance in the electrolytic preparation of beryllium is the choice of a suitable mixture as electrolyte, since the halide salts of beryllium melt at high temperatures and are not particularly good conductors of electricity. The problem has been investigated by Schmidt, and by Stock and Goldschmidt. The former investigated various mixtures of beryllium chloride with other metal chlorides with a view to ascertaining whether a mixture could be obtained which melted at a low temperature, conducted well, and did not volatilise. He found that $BeCl_2$-NaCl fulfilled these conditions fairly well, but that the electrolysis of this mixture could not be made to give a good yield of the metal. He was able to get a powder containing 81 per cent. of beryllium by the reduction of beryllium chloride with sodium; his most successful electrolytic preparations were those in which a mixture of lithium chloride and beryllium chloride was used. The firm of Siemens-Halske, of Siemenstadt, prepared beryllium by the electrolysis of the basic beryllium fluoride obtained by melting together barium fluoride and beryllium oxyfluoride. This gives a 99·5 per cent. purity. The double barium and beryllium fluoride method originated with Stock and Goldschmidt. They found that the double fluoride $BaBeF_4$ was somewhat viscous even at 1,300° C, and almost non-volatile. On the other hand, the double fluoride with sodium $NaBeF_3$ is strongly dissociated even at low temperatures. They therefore suggest the following procedure. The bath is started by melting in it the sodium beryllium fluoride, and barium beryllium fluoride is added until the temperature reaches 1,300–1,350° C. The electrolysis is then started and maintained for many hours, the only required addition being a mixture of the two double fluorides. The high temperature is made necessary by the high melting point of beryllium, since in the electrolytic production of metals, it is necessary to have the temperature

of the bath above that of the melting point of the metal, which would otherwise be produced as a powder.

This view was endorsed by the Beryllium Research Institute, formed in 1923 for the study of the commercial production and applications of beryllium. They also investigated the nature of the crucibles and electrodes required for the process, and came to the conclusion that a hollow water-cooled iron electrode was the most suitable for the cathode, and that a hard compressed graphite crucible would be the most suitable; lumps of beryllium up to 150 g.m. could be readily prepared of 98 per cent. purity.

Properties of the Metal

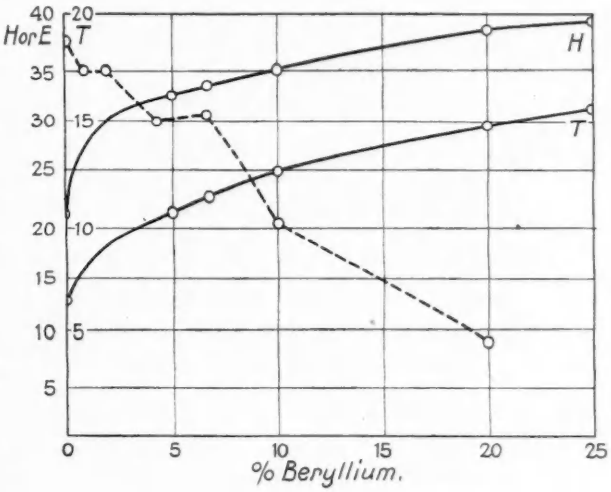
Beryllium is a steel-grey metal, the mechanical properties of which are not, at a low temperature, very impressive, for it cannot be worked at ordinary temperatures. At elevated temperatures it can be hammered and rolled, but at higher temperatures it burns like magnesium, and the working at high temperatures is likely to form appreciable quantities of the oxide. It has an atomic weight of 9·018, and a specific heat of 0·395−0·4/0°−50°C. The hardness of the metal is given as 6−7 Moh. and the melting point as 1,278±50° C. and 1,280±20° C. by different investigators. It easily tarnishes in air and shews a complete lack of ductility at ordinary temperatures. The density is given as 1·84, which shows that it is lighter than aluminium. It is the very low density of beryllium that has attracted so much attention to the metal, suggestions being plentifully made that it should be used for the construction of aircraft. Its poor mechanical strength *per se* militates against its use, save as the minor constituent of one of the light alloys. The co-efficient of expansion of beryllium is considerably less than that of aluminium, which is a considerable advantage in some respects; the co-efficient approaches that of mild steel. The heat of fusion is 341 calories per gram, and the conductivity of the metal to low pressure current is about $\frac{1}{12}$ that of copper.

A remarkable property of beryllium, and one which has already been put to extensive practical use, is the fact that it is remarkably transparent to X-rays. It requires a screen seventeen times as thick as that of the corresponding aluminium screen to cut out X-rays, so that thickness for thickness, beryllium is seventeen times as transparent as aluminium, hitherto the most transparent of the common metals. This property is made use of in the construction of windows in X-ray tubes for the emission of powerful beams of rays. In addition, beryllium is coming into use as electrodes for neon signs.

Alloys of Beryllium

There are three principal groups of beryllium alloys; those with aluminium, those with copper, and those with iron. The aluminium alloys were first constructed in the hope that alloying with aluminium might confer mechanical strength on the alloy obtained. It is a striking thing that the beryllium alloys are capable with considerable effect of being strengthened both by heat treatment and ageing; thus, for example, an alloy containing 2·4 of beryllium and the remainder aluminium had a hardness of 100 Brinell, which rose to 440 Brinell after a heat of 17 hours at 300°C., and in certain cases using 6 per cent. beryllium alloys, this figure could be raised to 730. The six per cent. alloys cannot be worked easily, but the 2·5 per cent. alloys can be easily rolled and forged, and what is more important, it can be heat treated and age-hardened in the cast condition. It follows, therefore, that the full strength can be developed by treatment of cast articles, a process which is not available with Duralumin. The general effect of the addition of beryllium to aluminium in regard to the hardness, tensile strength and elongation is given in the diagram of Kroll below. The addition of 20 per cent. of aluminium doubles the tensile strength. An American Patent (1,716,943) protects the preparation of an aluminium base alloy containing beryllium by heating to just below the Be-Al eutectic and quenching.

Analysis. Si	Fe	Be	Tensile.	Elongation (11·3 T.)	Hardness (as cast)
0·1	0·40	0·3	7·8	34·5	25·5
0·1	0·45	1·3	8·9	34·5	29·0
0·1	0·55	2·06	9·3	30·5	30·5
0·1	0·84	6·06	11·53	31·8	33·0
0·1	2·7	9·87	12·7	21·5	36·0
0·1	1·35	20·23	16·1	8·9	39·0
0·1	0·65	8·65	—	37·5	34·5
0·07	0·25	nil.	6·5	—	22·5

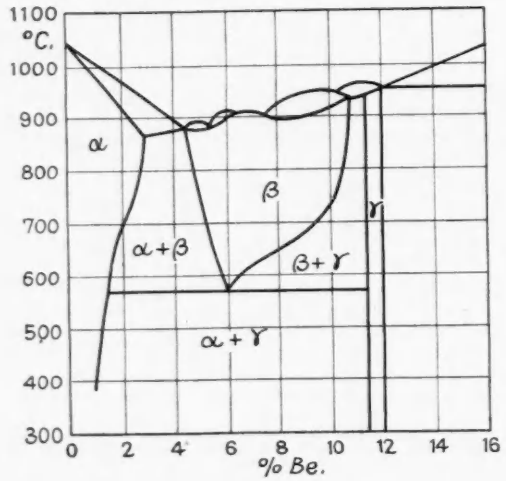


A similar patent suggests a temperature of 550—640° C. with ageing below 200° C. An interesting alloy originating with Siemens and Halske and used for springs and electrical contacts is obtained by alloying 1—11 per cent. of beryllium with zinc, and either aluminium or nickel. The alloy is quenched from 600° C., and aged at 150—200° C. It has considerable strength and elasticity.

The question of the hardening of copper has always been an important one from the point of view of electrical conductivity. The obvious hardener for copper—arsenic—lowers the conductivity of copper to such a degree that its use is inadmissible for the manufacture of cables, and it has been suggested that the use of beryllium might give a conductor of higher mechanical strength and of good conductivity. The attempts at producing such alloys have not been entirely unsuccessful; beryllium copper alloys have a fairly high conductivity and are substantially stronger than copper in the pure state. The phase diagram obtained by Masing for the copper beryllium alloys is given below, from which it is clear that the properties of the alloy will depend considerably on the extent of heat treatment. The actual figures for a series of copper-rich beryllium alloys are given in the table. The electrical conductivity can be shewn to vary with the heat treatment. Thus with the second alloy in the table, that containing 2·5 per cent. of beryllium, after quenching from 800° C. the conductivity was 9·8 reciprocal ohms; after heat treatment 19, and after heat treatment a second time the conductivity was 21·5 reciprocal ohms. It may be added here that the presence of beryllium confers a certain measure of resistance to corrosion by salt water; this is equally true of the aluminium-beryllium alloys just discussed. A 70 per cent. Be—30 per cent. Al stands up to salt water very well. Gregg has described a copper alloy obtained by adding 3 per cent. of beryllium silicide to molten copper. This alloy hardened rapidly on cold working, and after quenching and age-hardening at 427° C. had a tensile strength of 52,200—71,200 lbs./sq. in.

Alloy.		Elastic Limit 10·003% perm. extn.			Yield Stress 0·2% perm. extn.			Breaking Stress kg/sq. mm.			Elongation Per cent.		
Cu	Be	Q	Aged	Ann	Q	Aged	Ann	Q	Aged	Ann	Q	Aged	Ann
98	2	6·2	25·0	12·8	11·0	24·0	22·0	51·3	87·2	55·5	46	4	22
97·5	2·5	5·0	45·9	21·2	15·7	128·0	31·1	48·9	135·0	66·3	32	0·8	21
97	3	9·1	54·2	—	20	133·8	32	55·6	150·3	67·8	24·6	1	23·6

Among the more interesting of the rare alloys of beryllium is that with silver, which has corrosion resisting properties, which would not have been foretold from the characters of the two constituent metals. The presence of the beryllium



confers a corrosion resisting property to the silver which is said to be similar to that associated with the action of chromium on steel. It appears that attempts will be made to use this alloy as a true "stainless silver," but commercial application has not yet been made.,

Beryllium and Iron

In the search for a form of heat treatment for steel that would protect it against the streams of hot hydrogen used in the Berginisation process, it was found that by spraying the outside of the steel with metallic beryllium and allowing to remain heated at 900° C.—1150° C. the beryllium diffused into the steel giving a case that would withstand the action of the hot hydrogen. The fact that beryllium is a "typical" element of small atomic weight, situated in the first period of the periodic System, would lead us to expect this result as natural, more especially as the element is adjacent to carbon. The numerical data for the mechanical properties of beryllium steel do not appear to be available, but various patents have been taken out covering certain of the iron-beryllium alloys. Thus U.S.P. covers the use of an alloy containing iron 46—90 per cent.; beryllium 2—12 per cent.; and chromium 4—42 per cent. for the manufacture of carbonising boxes. It appears that both α- and δ-iron form mixed crystals with beryllium, and that these alloys can both be subject to agehardening. The addition of some nickel gives a very fine grained structure and decreases the amount of beryllium required. The following alloy containing 20 of chromium, 7 of nickel, 1 of beryllium and 72 of iron has a Brinell of 480, and has been used as a high-speed tool steel. Siemens-Halske a similar alloy containing up to 25 per cent. of chromium, tungsten, molybdenum or vanadium; 0·1—2 per cent. of nickel; 1—12 per cent. of beryllium and the remainder of iron. Such an alloy is quenched for use from 800—1200° C. and can be age-hardened from 300—700° C.

Cosach Finance

ARRANGEMENTS for financing the Cosach nitrate company are nearing completion, and it is possible that the issue may be made towards the end of the present month. It is likely that the portion to be issued in this country will be about £2,000,000; £1,000,000 (or possibly rather more) will be issued on the Continent, and the remainder in America. The total nominal amount of the bonds is likely to be about £9,000,000; of this, however, only £6,000,000 will represent new money. The new financing will thus be on a very much lower scale than was at first intended. The reduction is due to an arrangement having been made for the funding of the next three years' obligations to the Chilean Government, and to the abandonment of the new construction programme.

Institute of Chemistry

Officers for the New Year

THE following are the officers and members of Council of the Institute of Chemistry elected to serve for the year 1931–32.

President.—George Christopher Clayton, C.B.E., Ph.D.

Vice-Presidents.—Frederick Daniel Chattaway, D.Sc., F.R.S.; Lewis Eynon, B.Sc.; George Gerald Henderson, D.Sc., F.R.S.; Edward Hinks, M.B.E., B.Sc.; Bernard Farmborough Howard; Arthur Smithells, C.M.G., D.Sc., F.R.S.

Honorary Treasurer.—Patrick Henry Kirkaldy.

Members of Council.—Edward Richards Bolton, London; Henry Vincent Aird Briscoe, D.Sc., A.R.C.S., Newcastle; Harold Bush Brown, York; Walter Ferguson Buist, B.Sc., Liverpool and North-West Coast; William John Atkinson Butterfield, M.A., London; Alec Munro Cameron, B.Sc., Edinburgh and East of Scotland; Norman Mederson Comber, D.Sc., F.R.C.S., Leeds; Albert Coulthard, Ph.D., Manchester; Albert Ernest Dunstan, D.Sc., London; William Robert Fearon, M.A., Sc.D., Irish Free State; Arthur Gordon Francis, B.Sc., London; Charles Stanley Gibson, O.B.E., M.A., M.Sc., London; Frederick William Harris, Glasgow and West of Scotland; John Hawthorne, B.A., Ph.D., Northern Ireland; Isidor Morris Heilbron, D.S.O., D.Sc., Liverpool; The Right Hon. Lord Henley, M.A., Rugby; Thomas Percy Hilditch, D.Sc., Liverpool; Leonard Eric Hinkel, D.Sc., Wales and the County of Monmouth; Herbert Henry Hodgson, M.A., Ph.D., Huddersfield; George Nevill Huntly, B.Sc., A.R.C.S., London; George King, M.Sc., Birmingham; James Grieve King, Ph.D., A.R.T.C., London; Herbert Levinstein, M.Sc., Ph.D., Manchester; Percy Lewis-Dale, Ph.D., Crewe; Dorothy Jordan Lloyd, M.A., D.Sc., London; Harry Malkin Mason, M.Sc., North-East Coast and Yorkshire; Hamilton McCombie, D.S.O., M.A., D.Sc., Cambridge; William Johnson Smith Naunton, M.A., Ph.D., Manchester; George Henry Perry, O.B.E., B.Sc., A.R.C.S., London; Eric Keightley Rideal, M.B.E., B.Sc., F.R.S., Cambridge; Bert Pusey Ridge, Ph.D., Manchester; William Henry Roberts, M.Sc., Liverpool; William David Rogers, B.Sc., A.R.C.S., Manchester and District; Edward Russell, B.Sc., Bristol and South-Western Counties; George Stubbs, C.B.E., London and South-Eastern Counties; William Wardlaw, D.Sc., Birmingham and Midlands; John Weir, M.A., Ph.D., Glasgow; Forsyth, James Wilson, Ph.D., D.Sc., Glasgow.

Society of Public Analysts

Officers and Council for the New Year

THE annual general meeting of the Society was held at the Chemical Society's Rooms, Burlington House, London, on Wednesday, March 4, when the President (Dr. J. T. Dunn) delivered his annual address.

The following were elected as Officers and Council for the year 1931:—*President:* Dr. J. T. Dunn. *Past-Presidents serving on the Council:* E. Richards Bolton, A. Chaston Chapman, Bernard Dyer, Edward Hinks, P. A. Ellis Richards, G. Rudd Thompson, J. Augustus Voelcker. *Vice-Presidents:* A. More, W. Partridge, G. Roche Lynch. *Hon. Treasurer:* E. B. Hughes. *Hon. Secretary:* F. W. F. Arnaud. *Members of Council:* F. H. Carr, C. H. Cribb, D. W. Kent-Jones, H. M. Mason, G. W. Monier-Williams, G. Stubbs, A. R. Tankard, A. L. Bacharach, H. E. Cox, E. M. Hawkins, A. E. Johnson, W. G. Messenger.

An ordinary meeting of the Society then followed, the President (Dr. J. T. Dunn) being in the chair. Certificates were read for the first time in favour of K. N. Bagchi, B.Sc., M.B., D.T.M., William Nelson Bradshaw, B.Sc., Adrian Joseph Clifford Lickorish, F.I.C., Ernest Grenville Purser, B.Sc., A.I.C., and William Waddell Robson; and for the second time in favour of:—Cecil Chivers, B.Sc., F.I.C., Jack Hubert Hamence, M.Sc., A.I.C., Cecil John House, B.Sc., A.R.C.Sc., F.I.C., and Henry George Rees, B.Sc., A.R.C.Sc., A.I.C.

The following were elected members of the Society—Kenneth Bullock, M.Sc., Ph.D., and Frederick Cecil Hymas, B.Sc., A.I.C.

Papers were read on "The investigation of Japanese beeswax" by H. Ikuta; and on "The Denigès-Oliver test for morphine" by J. Bamford.

Institution of Chemical Engineers

Important Papers and Discussion at Annual Meeting

A full programme had been arranged for the ninth annual corporate meeting and annual dinner of the Institution of Chemical Engineers held in London on Thursday and Friday, March 5 and 6. The President (Mr. J. Arthur Reavell) was in the chair, and the first day's proceedings took place at the Rooms of the Chemical Society, Burlington House, and the second day's at the Hotel Victoria.

Annual Business Meeting

Progress during the Year

THE annual business meeting of the Institution was held at the Hotel Victoria on Friday morning, when Professor J. W. Hinchley (Hon. Secretary) presented the Council's report for 1930. There had been few outstanding changes, he said, and the rate of growth of membership was exactly the same as in the previous year, the net increase being 63.

The most important problem which the Institution had to face was that of education. There was little doubt that our educational institutions did not make it their business to produce men who were qualified to become chemical engineers. This had been pointed out by several of the members two or three years ago, and had led to the establishment of another evening class in chemical engineering by the London County Council at the Hackney Technical Institute. During the present session there had been 11 students attending. The Battersea class had continued with the same degree of success as formerly, and he believed it was as full as it could possibly be. The Institution's Appointments Bureau was functioning successfully, and where there were satisfactory candidates there was no difficulty whatever in finding them suitable posts. The Graduates and Students Section of the Institution was extremely virile, and its members were full of enthusiasm. The Benevolent Fund had reached a total of £195 2s. 9d. An interesting feature of the Institution's activities in 1932 would be in connection with the visit of the American Institute of Chemical Engineers to this country. The celebrations of the Faraday Centenary, to be held in September, 1931, were being entered into with enthusiasm by the Institution, and, with the help of the members and the general funds, it had raised fifty guineas, which had been paid to the Centenary Fund. The movement for the establishment of a central building to house the technical and scientific societies had encountered and surmounted many difficulties, but there was reason to believe that success was about to be achieved. The representative of the Institution on the Board of Management of the Association of Scientific and Technical Institutions was Mr. W. MacNab (a member of Council and a former Vice-President), and the Board had also the counsels of Sir Alexander Gibb (the second President of the Institution).

The President, moving the adoption of the report and accounts, commented particularly upon the Benevolent Fund, and expressed the hope that members would bear it in mind, and that it would continue to increase.

The ballot for the election of hon. officers and members of Council for the ensuing year was announced as follows :—President, Mr. W. A. S. Calder ; Vice-Presidents, Mr. George Gray, Dr. W. H. Hatfield ; Hon. Secretary, Professor J. W. Hinchley ; Hon. Treasurer, Mr. F. A. Greene ; Members of Council, Mr. C. S. Garland, Mr. H. Talbot, and Mr. S. G. M. Ure ; Associate Member, Mr. E. A. Reavell.

Presentation of Medals

Sir Alexander Gibb (Past President) presented to the retiring President (Mr. J. Arthur Reavell) the Osborne Reynolds Medal for the year 1930. The medal is awarded each year for the most meritorious service for the advancement of the Institution, and was given to the Institution by Mr. F. A. Greene (Hon. Treasurer). Sir Alexander said that the choice of Mr. Reavell as the recipient of the medal for 1930 could not have been better, and the members of the Institution were very proud indeed that he should accept it.

The President, in his response, said that anything he had done for the Institution had been done whole-heartedly because he believed its work to be of great national importance. He had been stimulated by the example of predecessors.

The retiring President presented the Senior Moulton Medal for 1930 to Mr. A. T. King (of the British Research Association for the Woollen and Worsted Industries) for a paper on "The treatment of suint liquors from wool scouring," and the Junior Moulton Medal and Prize of Books to Mr. L. W. Blundell for a paper on "The Manufacture of Hydrogen Peroxide," read before the Graduates and Students Section.

Sir Alexander Gibb (Past President) proposed a vote of thanks to Mr. Reavell for his services to the Institution as President during the last two years. Under Mr. Reavell's able guidance the Institution had prospered greatly, and the members owed him a very deep debt of gratitude. No one could have held the Presidency with more dignity and with more skill, and his period of office would be recalled in the future as one of the most prosperous and happy periods in the Institution's progress. Mr. W. MacNab endorsed Sir Alexander's remarks.

Training the Chemical Engineer

Chemistry or Engineering as Basis

Opening a discussion on "the education and training of the chemical engineer," the President said that prior to 1925 nothing was published in this country on the training of a chemical engineer, and chemical engineering work was carried out by engineers, or chemists, who took an interest in chemistry or engineering respectively, or whose vocation took them into chemical works. In September, 1925, however, the Institution had issued a leaflet on the training of a chemical engineer, and, as a result, there were several universities and colleges—and the number was increasing—at which students with a chemistry or engineering degree, usually an honours degree, took a post-graduate course, extending over a year, or more, in chemical engineering. The greater part of the work of a chemical engineer had to do with engineering, rather than chemistry, and, therefore, the engineering side of his training must be emphasised. This applied whether a chemical engineer was employed in a chemical works, where he was looking after the chemical engineering side, although the main function of the works was the production of chemicals ; or whether he was with a chemical plant manufacturer, where his main duty was the construction of plant to suit definite chemical processes, reactions or requirements.

In addition to engineering and chemistry, physics, both pure and applied, was very necessary, for the chemical engineer was dealing constantly with problems of heat transfer, radiation, heat conductivity, gravitation, and densities. Physics in relation to chemical engineering had been described as a catalyst that changed the two independent subjects of engineering and chemistry into the important science and practice of chemical engineering.

An analysis of the Institution examination questions showed them to be 60 per cent. engineering, 20 per cent. physics and 20 per cent. chemistry—and he did not think this was far wrong. Was it better to advise the average man wishing to train as a chemical engineer to take first the engineering course in a university, which included chemistry, physics and electricity, and then follow with a post-graduate course in chemical engineering ; or was it better to advise the normal course in chemistry, which one must admit gave him pure physics, no engineering, little, if any, electricity, and then go on to the post-graduate course in chemical engineering ? The correct method, based on the present curricula available in our universities, seemed to be for the chemical engineer to take an engineering course first, and then to go on with his post-graduate chemical engineering course. It was questionable, however, whether those interested were satisfied with this post-graduate course, or whether it was not better to have a complete chemical engineering course which would enable a student to take a chemical engineering degree. The present chemical engineering training demanded a longer period than either a chemist or engineer gave, in order to obtain a degree.

Therefore, we must consider whether it was possible to train a chemical engineer in less time than that taken for a chemistry or engineering degree, plus a post-graduate course. It seemed quite certain that we could not attain a high standard in less than a four years course. If we admitted this—and he submitted that we must—then a syllabus should be prepared by educational experts to give a chemical engineering student a suitably well-balanced training. In the first two years of his course the chemical engineering student should work with the engineering, chemistry and physics students, utilising their existing laboratories and teaching staff, and during the last two years he should work in the chemical engineering laboratories. At the end the student should be able to take a degree in chemical engineering. If this were agreed, then the degree in chemical engineering would be more difficult to take than an ordinary honours degree in either chemistry or engineering, so that when the man left the university he should be able at once to take a more responsible and, therefore, a more remunerative position than the chemist or engineer when he left the university after obtaining his degree.

Institution's First Examination

Sir Frederic Nathan (Past-President) said that the Institution's first examination for associate-membership was held in the summer of 1926, when there were six entrants, only one of whom had satisfied the examiners. The examiners had then stated in their report that the results emphasised the great need for further educational facilities in chemical engineering. In the period from 1926 to 1930, 26 candidates had sat for the examinations, and 12 would be sitting this year. Of the 26, 11, or 42·3 per cent., had passed, and there had been a steadily increasing percentage of successes. The two principal places at which students were given a post-graduate course in chemical engineering were the Imperial College of Science and Technology, and University College, London. At the former, 36 had taken the course during the six years from 1924 to 1930 inclusive, and 11 students are at the college at the present time taking this course. Again, 35 students had passed through the Ramsay Memorial Laboratory at University College to date, and 10 are training there. With one or two exceptions, all these men had obtained satisfactory employment. There were also chemical engineering courses of later date at King's College, London, the Municipal College of Technology, Manchester, and the Royal Technical College, Glasgow, but as to these he had no details.

"Engineer and Chemist"

Sir Robert Robertson said the subject was largely one of labels and definition, and the label which he would prefer, and which had been suggested by Professor Donnan, was that of "engineer and chemist" rather than that of "chemical engineer." It seemed to him that a chemical engineer must be in the first place a well trained physical chemist, because he looked upon chemical engineering as being applied to physical chemistry. Secondly, the chemical engineer needed a top dressing of engineering—and that was not difficult to get (laughter). Thirdly, the chemical engineer wanted some instruction or experience in the performance of small-scale experiments. Fourthly, he required that personality which, Sir Robert was bound to confess, the engineer possessed more often than did the chemist, and which was due to contact with men.

Foundation of Chemistry

Mr. John McKillop declared that in the main he agreed that the foundation should be chemistry and that there should be a superstructure of engineering. He urged that the demands of industry for this type of man must be considered. Industry did not expect to get men having the capacity of the specialist in physics and chemistry and the specialist in engineering; it could not get such men. A man having a basis of chemistry and a veneer of engineering could be employed in an industrial concern first in manufacturing research—a very good training ground, where he would be engaged in ascertaining whether or not manufacturing plants were operating at their maximum efficiency—then in a short time he became familiar with the operation of plant, and if he was keen he would obtain ideas as to how they could be improved.

A New Problem

Mr. F. Heron Rogers urged that the problem of the training and education of the chemical engineer should be tackled as a new problem, and by methods such as they themselves would employ when designing a new plant. He believed the chemical engineer was going to evolve his own education. He should be a first class chemist and a first class engineer, and the better was he educated in both these subjects, the better would he be equipped for his real job. Some in this relatively newly recognised profession could specialise, as folk could do in all professions, but specialisation must be the crown of effort, and not its basis.

The chemical engineer of to-day must know chemistry and must feel it—not, perhaps, the type of chemistry that would enable him to quote at random request the reactions in the synthesis of indigo, but he should have most certainly at his finger-tips the reactions involved in industrial chemistry, and, above all, he must be a first-class physicist, that he might appreciate heat, the action of light and wave motion, the formation of crystals, of solubilities and mass action, and a host indeed of kindred subjects. And so, having sought and found his data, he could in his isolated condition start to design as an engineer, use his materials to resist forces or corrosion, apply power to move or impel his materials, plan his assemblies, stage his flows and, finally, appropriately house the whole. He who could do this was a chemical engineer, and his education could not be too high in either branch of science; nor could it ever be finished.

Importance of Experience

Mr. W. Rintoul (Joint Research Manager, Imperial Chemical Industries, Ltd.) said that probably it was impossible to produce, in any of our teaching institutions, a chemical engineer. All that we could hope to do was to give a man a certain groundwork upon which he could build afterwards and become a chemical engineer by reason of his subsequent experience. Whereas a knowledge of chemistry had to be acquired, engineering was inborn in all of us to some extent. That being so it seemed right to expect that a would-be chemical engineer should first be trained thoroughly as a chemist, and then should add to that training a superstructure of engineering. The chemistry did not stop at the point reached when a plant had been designed and put to work, and there were very few cases in which a plant, when once built and put to work, gave maximum economic results without requiring further chemical study.

Example of Petroleum Industry

Dr. A. E. Dunstan (Anglo-Persian Oil Company) said in his view the chemical engineer was a chemist who worked on a mathematical basis, a physical chemist working on a big scale. It was perhaps fair to say that the chemical engineers in the petroleum industry had been brought up on sound chemical training; their engineering training—whether the men had been given that training in the works laboratories, or whether they had come to the laboratories as post graduates—had been somewhat akin to the "top dressing" referred to by Sir Robert Robertson. A man could not be trained in a university to be a plant man, any more than the universities could turn out a complete medical man; the medical man must learn by experiment on humans, and the chemical engineer by experiment on plant. He would deprecate very strongly having to employ men trained as the president had advocated, *i.e.*, the men who had been trained in engineering, and upon whose engineering training he would have to provide a superstructure of chemistry; he would feel almost foredoomed to failure under those circumstances. On the other hand, several hundred men who had passed through his hands had started as good chemists and many of them had become extraordinarily good chemical engineers.

Need for University Course

Speaking as Chairman of the committee which had drawn up the memorandum on the training of a chemical engineer in 1925, Mr. C. S. Garland said that the committee had regarded that only as a stop-gap; they had realised that it was impossible to persuade the universities to start with courses for their undergraduates in chemical engineering, but he believed they all held the view that that was the end to aim at. So far we had been satisfied to accept the chemist with the top dressing of engineering, or the engineer with a top dressing of chemistry, but it was only by establishing undergraduate courses in chemical engineering, leading up to a degree in that subject, that the profession could ultimately flourish.

Industrial Firms and Chemists

Professor A. Smithells said he was amazed when he had heard that the first publication in this country dealing with the training of a chemical engineer did not appear until a comparatively recent date, because he could recollect discussions about chemical engineering as far back as half a century. He did not think he had heard any educational topic discussed more or discussed to less purpose.

After describing the educational scheme of the Salters' Company in which he was interested, Professor Smithells said that during the last few years he had tried—it was a revival of an earlier effort he had made many years ago—to persuade some of the large industrial firms who really understood what chemists were and what to do with chemists, to take trained students in a non-committal way for a specified period, and to allow them not by any means to have the run of the works but to come into contact with large scale operations. The importance of that was not so much in being able to provide the large firms themselves with well-trained chemical engineers, for that was not where the shoe pinched. From his survey of industry, it appeared that help from chemical engineers was needed most in places where the functions of a chemical engineer were least understood, and where the demand was least. He was constantly being met with demands for chemists by firms engaged in important industries, who had not the slightest notion of what a chemist was. Thoroughly well trained young chemists, who under most favourable conditions would develop into excellent chemical engineers, went into such works where their employers did not know how to use them, and one heard within a short time that the employers had tried chemists, but that the chemists had served no useful purpose. If we could, in addition to the training at the teaching institutions provide something akin to apprenticeship, a great step in advance would have been made. Such a proposal had been accepted in one case. Another instance of that kind of thing was the training of the chemical engineers at the Massachusetts Institute of Technology. The graduates there, after going through their course on the theoretical side of chemical engineering, visited for a period of some six weeks each four manufacturing establishments, of very high standing, which had associated themselves with the Institute. That was not a very long period of apprenticeship, but matters were so arranged that a representative of the Institute was present in each of these manufacturing establishments, and after a few weeks the students went back with a very useful preliminary experience of what chemical engineering was on the large scale. He prayed that encouragement might be given wherever possible to young chemical engineers to spend some period in large chemical undertakings where they would be given proper information of the duties and of the conditions under which they would have to work.

Attitude of Engineers

Mr. H. T. Tizard (Rector, Imperial College of Science and Technology) said there had been an informal committee working at the Imperial College for the last year attended by most distinguished engineers, and he had asked them whether they thought that the training was practical enough. They had all said that the University should stick to the principles, and that they would make engineers of the men trained. That was highly encouraging as showing the attitude of leaders of industry in this country.

Discussion of Papers

At the first session on Thursday morning the following papers (of which a summary appeared in our last issue) were presented :—" Flax Wax and its Extraction," by W. H. Gibson, D.Sc., F.I.C., " The Recovery of Gum from Fossil Kauri Timber," by R. G. Israel, Ph.D., and " The Extraction of Terpene Chemicals from Waste Pine Woods," by I. W. Humphrey, A.B., A.M. (of U.S.A.). Several well-known authorities took part in the subsequent discussion.

Mr. C. E. Sage

Mr. C. Edward Sage, discussing Dr. Gibson's paper, said that flax wax was not a novelty, but it had never attained any marketable value as a commodity upon which one could place reliance. The proposition of extracting and using flax wax commercially was bound up with that of cost ; he believed it was not a proposition by which one could expect to make money, and there were many difficulties of a technical nature.

Discussing Dr. Israel's paper, Mr. Sage said that Dr. Israel had apparently been dealing with the swamp Kauri timber, and had encountered a product which was different in many respects from the old fossil material. The bush Kauri contained different constituents, and he assumed that that was due to oxidation and alteration of the resins. Kopal, which was of a somewhat similar nature, had to be heated and submitted to a process which was almost destructive distillation before it could be dissolved, and the best solvent for this " cooked " Kopal was the product of its own distillation ; in other words, it was stewed in its own juice. The old-fashioned Kauri would not dissolve readily in the ordinary solvents. Usually he used a mixture of acetone and methyl or ethyl alcohol, and the material which was soluble in benzol and alcohol must be entirely different from the material he had been in the habit of handling—either the old fossil Kauri or the bush Kauri. He would very much like to see some of the products of the two resins which were soluble in benzol and alcohol respectively, and he also questioned whether the proposition was a commercial one.

Dealing with Mr. Humphrey's paper on the extraction of terpene chemicals from waste pine wood, he commented upon the conditions under which the men in the turpentine camps of Georgia worked, conditions which would not be permitted in this country. He added that when he had left America there were huge heaps of sawdust there—something like the pit tips in England—all containing alcohol and turpentine. It had been allowed either to rot, or had been burned, or had set fire to itself. The problem of dealing with the old turpentine trees would arise in India and Burma. The question to be considered by chemical engineers was how they were going to deal with quantities. Some twenty-five years ago he had taught that American turpentine was always dextrorotatory, and that the French was laevo-rotatory, but he did not know what the Spanish would be.

Dr. L. A. Jordan

Dr. L. A. Jordan (Director, Research Association of British Paint, Colour and Varnish Manufacturers) referred to the development of flax in the plant and said some time ago the Linen Research Association had investigated the time at which the linseed oil developed in the linseed, and he was inclined to think that before very long that work would be exceedingly valuable and that we should reach the stage at which we should be inviting the linseed growers in India and elsewhere to cut their crops at a specific time and not to allow them to reach a condition of over-ripeness.

Dealing with Kauri and rosin, he said Kauri, as it was known, say, to the varnish maker—i.e., the straight Kauri, recovered from the fossil remains and so forth—had very remarkable properties. It was exceedingly hard and difficult of solubility, but, nevertheless, when it was dealt with, it was a wonderful product. Some 20 or 30 years ago Kauri had held the field, and he was convinced that the people who were responsible for the development of Kauri at that date had rather " stung " the Englishman and other people who had had to use it. The result was that an inferiority complex had developed with regard to Kauri and even to-day when Kauri was mentioned one immediately began to look for trouble.

The use of rosin was increasing tremendously in all kinds of industries—for sticky fly-paper varnish, sealing wax, printing ink, linoleum, and even more recently it was finding considerable development in the rubber industry ; perhaps it had played a very great part and a part not fully acknowledged, in the development of certain types of synthetic resins, where it was used as a flux. In short, the value of rosin was that it was the cheapest organic material of high molecular weight that we knew, and had considerable dispersing action, considerable solvency action—whether on oil polymers or not it did not matter—and any trouble which had been experienced in the use of resin was due very largely to abuse, because rosin had been far too generous in the excellent properties which it had offered mankind to exploit. Again, as Mr. Humphrey had pointed out, the terpene chemicals were in themselves becoming the basis of an industry, almost as important as, say, the industry which had arisen from the use of petroleum products. Perhaps neither could be compared with the industry which had arisen from coal tar, but in connection with terpene chemicals there were signs nevertheless of our

going back to the primary source of things, of which we had as yet very little conception.

Mr. H. J. Pooley

Mr. H. J. Pooley, who had had personal experience of the three extraction processes dealt with, said that during the war he had been in a position to extract considerable quantities of flax wax—several tons at a time. The problem of ensuring adequate supplies was an important factor. A manufacturer who might wish to use it might be content, when his business was growing, with the 100 tons or so which the Belfast district could supply, but when his business had developed, and he required more flax wax, he would be in difficulties. That was a reason why, although flax wax was an excellent constituent of boot polishes, etc., the manufacturers of such products would not use flax wax, and why the Belfast linen manufacturers did not go further with its extraction.

With regard to Kauri gum, his own experience was that the fossil Kauri was quite reasonably soluble—he would not say *easily* soluble—in a hot mixture of alcohol and benzol; that was the method he had used for extraction when dealing with the Kauri washed out of the alluvial deposits. Discussing the pine wood extraction plant, he said, in reply to Dr. Jordan, that the essence of the process was the use of the vapour of the solvent, after the steam distillation, for the drying out of the wood chips sufficiently to allow the extraction to take place. The solvent vapour was slightly superheated; it was used as a drying agent, and ultimately as the extraction agent.

Each of the authors afterwards replied briefly to points raised in the discussion.

The Annual Dinner

Sir Ernest Benn and the Economy Campaign

Over 250 people attended the annual dinner at the Hotel Victoria, where those present included Lord Rayleigh, F.R.S., Sir Ernest Benn, Sir Harold Hartley, F.R.S., Dr. W. R. Ormandy, Mr. W. A. S. Calder (President-Elect), Sir Joseph Petavel, Sir Frederic Nathan, and Baron G. A. Blanc.

Lord Rayleigh, proposing "The Institution of Chemical Engineers," said its formation marked an epoch in the profession which it represented and it was instructive to consider the conditions before the establishment of the Institution and those at the present time. Reading the life of the late Sir Henry Bessemer one could truly say that Bessemer was a chemical engineer, but the great difference between Bessemer and the chemical engineers of to-day was that Bessemer was essentially an individualist. He worked entirely on his own initiative, whereas the whole tendency to-day was co-operative work, without which the best results could not be expected. It might be that a little of the romance of industry had gone out as commercial conditions had come in and he had often reflected what would have been the position of some of the early workers if they had had to pass examinations such as those now set by the Institution of Chemical Engineers. As a matter of fact he had often wondered why certain questions were put in such examinations, and at times had been tempted to suspect that the examiners themselves did not know the answers, but hoped, by setting the questions to students, they might possibly get some information themselves.

The President acknowledging the toast, welcomed their guests of the evening. He had long been one of Sir Ernest Benn's admirers, and he felt that the economy campaign which Sir Ernest had taken up was a vital matter for the nation, because at the moment waste was rampant and the possibility of initiative was being strangled by listless and indifferent politicians of all parties. Another distinguished guest was Baron Gian Alberto Blanc, who had, on the previous day, at the meeting of the Institution, described one of Italy's new chemical developments. Speaking of the Institution and its work, the President said the membership was increasing in a satisfactory manner and had continued to increase in a regular ratio since the Institution was formed. On the educational side there were some who felt there was a difficulty in getting the universities to arrange a suitable educational course for students wishing to become chemical engineers. It seemed to him that it was much more difficult to educate the educational authorities than to educate the students!

Sir Ernest Benn, proposing "Economy and Progress," said he greatly appreciated the opportunity of speaking on the economy movement which a group of friends of his were busy with throughout the country. That campaign illustrated the theory which he had very much at heart, viz., that there is room for serious political thought outside the confines of the recognised political parties. The economy campaign had nothing of a party character about it and its influence might perhaps be judged by the fact that in the short space of one month, since the Cannon Street Hotel meeting, three things had happened—the Conservative Party at once tabled a motion of censure on the Government relating to economy; the Liberal Council issued a manifesto calling attention to the need for economy; and Mr. Snowden made his courageous and historic speech in the name of sane socialism. For 25 or 30 years the feature of British politics had been competition between the political parties to spend based on the wholly false and degrading notion that the people of this country require bribing and paying to take an interest in politics. If the economy campaign achieved the abolition of that competition it would have achieved great success.

Balancing Production and Consumption

Brigadier-General Sir Harold Hartley, F.R.S., who made the first response to the toast, congratulated Sir Ernest Benn on his courage and initiative and extraordinary soundness of view with which he had carried out his great economy campaign, which was undoubtedly going to have a great effect upon the fortunes of this country. Although economy in its broad aspect was highly desirable he did not think it would solve the problem with which we are now faced. The absence of balance between production and consumption was one of the great causes of the present discontent. He agreed with Sir Ernest Benn in his strong dislike of Government control and Government interference, and he believed that this balance between production and consumption could be reached by national agreements between the actual parties concerned, not by agreements on the part of Governments.

Dr. W. R. Ormandy also responded to the toast, and Mr. W. A. S. Calder (President-Elect of the Institution) proposed the final toast of "The President."

Mr. Reavell, responding, said he had a word for the younger chemical engineers. The country at the present time was in a difficult position but he did not want the young men to think that all romance had gone out of life. Opportunities still existed and the country needed the greatest efforts of its young men to-day, more even than during the War.

Imperial Chemical Industries, Ltd.

Final Dividend for 1930

THE directors of Imperial Chemical Industries announce that the gross profit for the year 1930 amounts to £5,129,757. After allocating a sum of £500,000 to obsolescence reserve and providing £156,365 for income tax, as against £575,478 and £146,653 for 1929, the net profit amounts to £4,473,392, which compares with £5,780,208 for 1929, a decrease of £1,306,816. With £349,926, which is the balance brought forward from 1929, less dividends paid in respect of further shares exchanged since the date of the last balance sheet, the total profit available is £4,823,318. No allocation has been made this year to general reserve, as compared with £529,020 allocated last year.

Of the total profit available the directors have decided to carry forward to 1931 £653,483 (an increase of £303,557 over 1929), leaving £4,169,835 available for distribution to the shareholders. After providing £1,554,554 for the dividend on the preference shares there remains £2,615,281 for the ordinary shareholders. An interim dividend of 3 per cent. on the ordinary shares was paid on October 8, 1930. The directors have decided to recommend a final dividend on the ordinary shares of 3 per cent. (actual), making 6 per cent. for the year (compared with 8 per cent. last year), less income tax at the standard rate for the year 1931–32, payable on June 1, 1931, to the shareholders on the register of members at April 16, 1931. The register of ordinary shareholders will be closed from April 16 to April 30, 1931, both dates inclusive.

As under the articles of association the deferred shares do not rank for dividend until the ordinary shares have received 7 per cent., no dividend is payable on this class of share for the current year.

The annual general meeting of the company will be held on Tuesday, March 31, at 11.30 a.m.

American Chemical Society

Programme of the 81st Meeting

NEW knowledge of life processes in both health and disease through the systematic use of chemistry will be a chief field of discussion at the eighty-first meeting of the American Chemical Society, to be held in Indianopolis, March 30 to April 3. More than 1,500 delegates are expected to attend. Hundreds of papers disclosing progress in practically every major sphere of chemical science will be presented by scientists from the industries, the universities and technical schools of the country. Their topics range from fads in foods to the uses of mathematics in chemistry.

The opening event, according to the preliminary programme made public by Dr. Charles L. Parsons, the secretary, will be a meeting of the Council on March 30, the president of the Society, Professor Gomberg, of the University of Michigan, presiding. Three symposiums are down for March 31: "Contemporary developments in the chemistry of physiologically active substances," "Co-operation between industry and chemical education" and "Mathematics in the service of chemistry." "Dietary Facts and Fads" will be the subject of a public address on April 1 by Professor William C. Rose, of the University of Illinois. The Divisions of Gas and Fuel Chemistry, Industrial and Engineering Chemistry, and Petroleum Chemistry will combine in joint sessions on "Utilisation of Gaseous Hydrocarbons." New and unpublished research work at agricultural experiment stations will be reported at a meeting of the Division of Agricultural and Food Chemistry. The Division of Cellulose Chemistry and the Division of Colloid Chemistry will join in a symposium on "The Physical and Colloid Chemistry of Cellulose and Cellulose Derivatives." The Paint and Varnish Division will discuss plans for research to improve the finish and durability of protective coatings. Sanitation, water softening, sulphide wastes and other problems of the water supply of cities will be discussed before the Division of Water, Sewage and Sanitation Chemistry. The Division of Sugar Chemistry, the History of Chemistry Division and the Division of Rubber Chemistry will also meet.

Pulverised Fuel Progress

New "Dunston B" Station at Newcastle

DURING the past year or two notable advance has been made with the "unit" system of pulverised fuel firing which is of considerable direct interest to the chemical industries, because of the operation not only of "Lancashire" boilers, but of all kinds of furnace and general heating work, in competition with oil and gas firing. The progress with the unit pulveriser is well indicated by the contracts that have been placed for the first section of the new "Dunston B" station of the Newcastle-on-Tyne Electric Supply Co., Ltd., which is to be ready for running in 1932. The main features can be summed up as moderate steam pressure (625 lb. per sq. in.), high superheat (825° F.), extensive reheating of the steam between the stages of the turbine, and the use of unit pulverisers upon a large scale. Essentially the plant will consist of six "Babcock" combined water tube boilers and reheater units and 6 "Clarke Chapman" boilers, each of the latter having a normal evaporation of 156,000 lb. per hour each.

The pulverised fuel plant throughout is of the "Resolutor" unit make, by Clarke Chapman and Co., Ltd., of Gateshead-on-Tyne, their complete contract, including the boilers, being £235,000.

North China Trade in Heavy Chemicals

THE North China demand for heavy chemicals during 1930 was somewhat below normal, but importers reported that when trading conditions are considered they are quite satisfied with the results. Imports of soda ash during 1929 amounted to 934,530 piculs, as against 845,861 piculs in 1928. There was a decrease in the imports of caustic soda. Militarism in the interior of this area was a factor curtailing the distribution of heavy chemicals throughout 1930. Some of the large industrial plants in the interior districts are now opening up, which will undoubtedly bring about increased consumption.—U.S.A. Trade Commissioner at Tientsin.

The Formation of Cokes

Methods of Carbonisation

A PAPER on "The Formation of High and Low Temperature Cokes" by John Roberts, D.I.C., was read at the meeting of the Institute of Fuel, held at the Chemical Society's Rooms, Burlington House, London, on Wednesday. The author first described the Beehive oven, and went on to a consideration of Stalactites and Stalagmites, hair carbon, and "Fish Roe" structures, and the characteristics of Beehive coke. In the manufacture of gas, coke was regarded more or less as a by-product, and for this reason insufficient attention had been paid to the quality of the solid fuel. This attitude could be understood when it is remembered that the distillation of coal in gas retorts was essentially a gas making process, and greater revenue was obtainable for therms in the form of gas than in the form of coke. Even so, the fact that about ten million tons of gas coke was manufactured every year ought to be sufficient to warrant that a large proportion of it should be produced in the best possible condition.

The requisite properties of domestic fuel, methods of heating coals, and examples of smokeless fuel were dealt with at some length. In conclusion the author pointed out that it must not be assumed that because the production of high volatile semi-coke was advantageous in low temperature practice, it was essential from the combustibility standpoint to have high volatile contents in the fuel. On the contrary, the percentage might be as low as 4, yet the combustibility would be perfectly satisfactory, so long as the texture of the fuel was right. Gas companies could still make free-burning coke at high temperatures, and so could coke oven operators, while those who had no ready outlet for gas should leave as much as possible in the smokeless fuel, by treating coal at low temperatures. There need be no antagonism between the sister industries as long as the ultimate aim was the abolition of the use of raw coal in domestic grates, and the abatement of the smoke nuisance.

The Institute of Metals

Twenty-Third Annual Meeting

THE twenty-third annual general meeting of the Institute of Metals was held in London on Wednesday and Thursday, the President, Dr. Richard Seligman, in the chair. The report of the Council for the year stated that membership had increased from 2,122 to 2,160 and the financial position had been more than maintained. New ground had been broken in several directions—particularly as regards the publication of the Abstracts section of the "Journal" in monthly instead of in half-yearly parts. The Council felt that nothing could have justified the existence of the Institute more completely than that it had been able, in a time of such universal stress, to extend and increase the efficiency of its services to the science and practice of non-ferrous metallurgy—services of outstanding international importance.

The Secretary announced that the Council for 1931 had been elected as follows:—President: Richard Seligman, Ph.D. Past-Presidents: Professor Sir Harold C. H. Carpenter, M.A., Ph.D., A.R.S.M., F.R.S.; Sir John Dewrance, G.B.E.; Engineer Vice-Admiral Sir Henry J. Oram, K.C.B., F.R.S.; Walter Rosenhain, D.Sc., F.R.S.; Leonard Sumner, M.Sc.; Professor T. Turner, M.Sc., A.R.S.M. Vice-Presidents: W. R. Barclay (Birmingham); Lieut.-Colonel Sir Henry Fowler, LL.D., D.Sc. (Derby); A. G. C. Gwyer, B.Sc., Ph.D. (Warrington); Professor D. Hanson, D.Sc. (Birmingham); R. S. Hutton, D.Sc. (London); Engineer Vice-Admiral Sir Reginald W. Skelton, K.C.B., C.B.E., D.S.O. (London). Honorary Treasurer: John Fry (London). Fifteen members of Council have also been elected.

A large number of papers by well known metallurgical authorities was presented for discussion during the meeting.

New U.S. Powder Laboratories

NEW laboratories, costing over £60,000, are nearing completion for the Hercules Powder Co., at Wilmington, U.S., and are to be formally opened within the next few months. The main building has been completed and a number of smaller units have been finished and are waiting for equipment to be installed.

From Week to Week

A MEETING of employers to consider the wages dispute in the dyeing industry was held in Manchester on Monday, but no statement has been issued on the deliberations.

THE FRIDAY EVENING DISCOURSE at the Royal Institution on Friday March 20 will be delivered by Professor E. N. da C. Andrade, on "Sound, sand and smoke," and on March 27, by Lord Rutherford, on "Helium and its properties."

UNIVERSITY NEWS: *London.*—The Senate has awarded a degree of Ph.D. in Chemical Technology on S. G. Ward, Imperial College, Royal College of Science and Technology. Mr. G. S. Hartley, B.Sc., Mr. J. W. Smith, Ph.D., and Mr. N. O. Stein, M.Sc., have been appointed Demonstrators in the Department of Chemistry at University College.

A CIRCULAR has been sent out by the British Alizarine Co., of Trafford Park, Manchester, advising its shareholders in their own intersts not to sell their shares until negotiations now in progress have been completed. The present authorised share capital of the company is £600,000, of which £457,000 is called up. It owns all the shares of British Synthetics, Ltd.

A JOINT MEETING of technical societies, including the Chemical Engineering Group of the Society of Chemical Industry, is being held on March 31, in the Lecture Theatre, The Institution of Mechanical Engineers, Storey's Gate, Westminster, where a paper by Dr. S. J. Davies and Mr. E. Giffen on "Injection, Ignition and Combustion in High-speed Heavy-oil Engines" will be read.

RECENT WILLS include Mr. Arthur Smith, of Bramley, Leeds, chemical manufacturer, (net personalty £21,675) £117,287. Mr. Herbert William Edmondson, of Harrogate, formerly manager of Belle Isle Dyeworks, Leeds, and a partner in Holroyd and Edmondson, Sheepshear Dyeworks, Leeds, (net personalty £2,648) £3,596. Mr. Thomas Pitkethly, of Langside, Glasgow, and of Bryce and Rumpff, merchants and chemical brokers, (personal estate) £7,682. Mr. John Alexander Hogg, of Cheltenham, works chemist to the United Chemists' Association, Ltd., Cheltenham, £1,206.

DR. ADDISON, Minister of Agriculture, informed the House of Commons on March 10 that twelve beet sugar factories had accepted the terms of the Government offer of a special advance, and had offered beet contracts to growers on the basis of the Government conditions. Six factories had not made use of the Government offer, namely, Cantley, Ely, Ipswich, Kelham, King's Lynn, and Peterborough. In reply to Sir Ernest Shepperson, Dr. Addison stated that with the exception of Peterborough the factories which had not used the offer belonged to the Anglo-Dutch group.

GEORGE FLETCHER AND CO., LTD., of Derby, announce that they have obtained an order to the value of £22,000 for engineering plant in connection with a sugar factory in India. This entails the supply of a fourteen-roller heavy cane milling plant, two steam engines, liming, sulphuring, and clarifying vessels to treat the juice chemically, triple effect vacuum evaporator with barometric condenser and dry air pump, filter presses, and necessary cane and bagasse handling plant. The vacuum pans, crystallisers, centrifuges and steam raising plant, usually associated with an order of this description, are already in existence. The firm has recently appointed Mr. J. M. Dixon, formerly with W. J. Fraser and Co., of Dagenham, as its London sales manager, with offices at 73, Basinghall Street, E.C.2. Tel. No. Met. 2876.

THE CITY OF BIRMINGHAM HANDBOOK, 1930–31, published annually by the Corporation, has now reached its fourth issue. It is an admirable production of nearly 300 pages, and describes the administration and amenities of the largest provincial city in the country. It has been compiled and edited by Mr. W. S. Body of the Town Clerk's office, and is copiously illustrated with views of the city and its many activities, while the various articles are as comprehensive and thorough as could be wished. As the Lord Mayor states in a foreword the book "forms a testimonial to the civic pride and achievement of Birmingham home of the skilled artisan and birthplace of the industrial revolution." Copies are available for free distribution on application to the City Information Bureau, Council House, Birmingham.

THE WORKS of the Onslow China Clay Co., Ltd., at Hawkstor, near Bodmin, have been closed down temporarily owing to trade depression. It is hoped to re-open as soon as there is a market for the clay, of which about 3,000 tons is in hand.

EXPORTS from the United Kingdom during February totalled £37,646,000, against £43,601,026 in January and £60,570,838 for the corresponding month in 1930. Total imports last month were £63,647,000, against £75,569,744 in January and £88,210,096 a year ago. Exports of chemicals were £1,201,841, a drop of £813,106 on the figures of February, 1930, and imports at £948,502 declined £121,000.

A FIFTEEN-YEAR-OLD boy, Edmund William Wright, received injuries which resulted in the loss of a hand while experimenting in his own "laboratory," at Fleetwood, on Saturday night. He had a mixture of sugar, chlorate of potash and sulphur in a brass tube and added some sulphuric acid. An explosion followed which blew another boy out of the room and so lacerated Wright's left hand that it had to be amputated at the wrist.

LOW TEMPERATURE CARBONISATION, LTD., announce that, in view of the receiving order made against the firm of A. Wheeler and Co., Leicester, of which Sir Arthur Wheeler is a partner, he has vacated his position as a director of the company. This will, however, have no effect upon its financial position and prospects. The directors record their appreciation of the great services rendered to the company by Sir Arthur Wheeler.

THE SALTERS INSTITUTE OF INDUSTRIAL CHEMISTRY is inviting applications from chemists of post-graduate standing for a limited number of Fellowships valued at from £250 to £300, or more in special cases. The committee of the Institute will also allocate, in July, a limited number of grants-in-aid to young people employed in chemical works, in or near London, who desire a career in industrial chemistry. Applications should be made in each case not later than May 1 next. Further details will be found in our advertisement columns.

A MEMORANDUM containing hints for the guidance of commercial visitors to Portuguese West Africa has been prepared by H.M. Consul-General at Loanda, and can be obtained from the Department of Overseas Trade, 35, Old Queen Street, London, S.W., on quoting reference number C 3,467. Another useful publication by the Department is a confidential memorandum on the appointment of agents, and terms and methods of payment in Sweden, together with some general notes on the market, prepared by H.M. Commercial Counsellor at Stockholm. (Ref. No. C.X. 3,473.)

THE ROYAL INSTITUTION, at its meeting last week, passed a vote of condolence with the relatives of the late Sir Charles Parsons, a vice-president. The thanks of the members were returned to Dr. W. Rushton Parker for his donation of 100 guineas to the Research Fund. The Rev. John M. Ballard, Mr. A. Q. Carnegie, Mrs. Grace D. Caroe, Mr. A. St. George Caulfeild, Mr. W. J. Corbett, The Hon. Violet Douglas-Pennant, Mr. E. V. Evans, Miss Helen S. Gilchrist, Mr. Paul E. Newnam, Lady Stonehaven, Rev. C. D. Thomas, Mrs. J. P. Trevelyan, Dr. W. A. Troup, Mrs. Van Montagu, Colonel and Mr. W. A. Vignoles were elected members.

THE COMMISSION OF CONTROL, which has just returned to Moscow after inspecing the Soviet soap factories at Rostoff and Kazan, reports that the enlargement of the plan has resulted in an increase of output of 33 per cent., which will enable the export of soap at rock-bottom prices to commence shortly. Three German experts are to begin work in the toilet soap factories at Moscow and Leningrad on April 1 to ensure that the product is of superior quality for export. The remuneration of the workmen in the Soviet soap factories is nine chervonetz, paid not in cash but in foodstuffs, and half a kilogram of blue soap, per month, plus one cloth suit every two years.

Obituary

MR. THOMAS HOWSE, founder of Thomas Howse, Ltd., paint manufacturers, of Quinton Works, Blackheath, near Birmingham, on March 6, aged 72.

MR. ROBERT WOODWARD, until recently chairman of Edgar Allen and Co., Imperial Steel Works, Sheffield, on March 9, aged 87.

Patent Literature

The following information is prepared from published Patent Specifications and from the Illustrated Official Journal (Patents) by permission of the Controller to H.M. Stationery Office. Printed copies of full Patent Specifications accepted may be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, at 1s. each.

Abstracts of Accepted Specifications

340,001. SYNTHETIC RESINS. A. E. White, London. From Thomas and Hochwalt Laboratories, Inc., Nicholas Road, Dayton, Ohio, U.S.A. Application date, July 16, 1929.

A cracked distillate boiling below 180° C., free from coumarone-indene constituents, and containing a high proportion, *e.g.*, 25-50 per cent., of olefines and diolefines, is subjected to the action of polymerising or activating agents of the type which will hydrolise with water to form acid, *e.g.*, aluminium chloride, a compound containing a hydroxyl radicle and/or a neutralising agent is added, and the mixture distilled to remove volatile constituents. The residue is dissolved in a hydrocarbon, alcohol or acetone being added to precipitate the resin. The product is non-acid in reaction, and unsaponifiable. The apparatus used is described.

340,004. POLYMERISING UNSATURATED COMPOUNDS. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 12, 1929.

Fatty acids such as acrylic, linoleic, ricinoleic and other long chain acids, or their esters or mixtures, *e.g.*, crude linseed oil, unsaturated aliphatic hydrocarbons with more than one double linkage such as butadiene, isoprene or other diolefines, or unsaturated aromatic compounds such as styrene, are polymerised, by warming with 0·1–10 per cent. of carbonyls of iron, nickel, cobalt, molybdenum, tungsten or chromium. Organic solvents such as aromatic hydrocarbons, petroleum fractions, esters or ketones or carbon tetrachloride may be present. Partly polymerised diolefines may be further polymerised in the presence of oxygen or substances supplying it such as peroxides or ozonides, or of oxygen transferrers such as heavy metal salts of fatty acids of high molecular weight, or resinic or naphthenic acids, or organic sulphonic acids. In an example, linseed oil is heated to 300° C. with iron or cobalt carbonyl while passing carbon dioxide through. The products are used in the manufacture of coatings, films, threads, or for joining materials with partly polymerised butadienes.

340,008. SYNTHETIC RUBBER. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 19, 1929.

Diolefines are polymerised by alkali or alkaline earth metals in the presence of an organic compound containing a carbon atom with at least two valencies satisfied by oxygen, *e.g.*, saturated and unsaturated acyclic or cyclic acetals such as dibutyl acetal, ethylene acetal or acetals from 1 : 2 and 1 : 3-glycols with aldehydes, unsaturated acetals such as those from crotonaldehyde or acrolein and butylene glycol. Ketones or aldehydes may be added, *e.g.*, acetone, methyl ketone, cyclohexanone, quinone, acetyphenone, benzophenone, furfural, or formaldehyde, acetaldehyde, crotonaldehyde, acrolein, benzaldehyde or cinnamic aldehyde. These additions are in the proportion of 0·05–5 per cent. of the diolefine, and if they react with the metal, an excess of the latter must be used, unless the product is a polymeriisng agent. The products are tough or soft, according to the proportion of organic compound added. The temperature may be up to 90° C. The products may be similar to rubber, or may be used for the manufacture of coatings, films, lacquers, etc.

340,009. DYES. J. Y. Johnson, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, August 19, 1929.

These azo dyes are of the tartrazine series and are substituted in the 1- and 4-positions of the pyrazolone ring by a phenyl and a phenylazo radicle respectively which each contain two sulpho groups. One pair of the sulpho groups occupies the 5^{I}- and 5^{II}-positions, and the other pair occupies either the 2^{I}- and 2^{II}- or the 3^{I}- and 3^{II}-positions. If each of the phenyl radicles carries a methyl group in the 2^{I}- and 2^{II}-positions, the second pair of sulpho groups occupies the 4^{I}- and 4^{II}-positions. The dyes are prepared by condensing one molecule of sodium dihydroxytartrate with two molecules of a phenyl- or tolyl-hydrazine-5-sulphonic acid carrying a further sulpho group, or by coupling a pyrazolone obtained by condensing one molecule of oxalacetic ester with one molecule of a phenyl- or *o*-tolyl-disulphonic acid, with the corresponding phenyl- or *o*-tolyl-diazonium compound containing two sulphonic groups. The products give greenish-yellow dyeings fast to water and suitable for printing on paper, particularly the lakes of the product from 2-aminotoluene-4 : 5-disulphonic acid. The products from aniline-2 : 5- and 3 : 5-disulphonic acids are fast to light and are wool dyes. Several examples of the two methods of preparation are given.

340,011-2. FATTY ACID DERIVATIVES. A. Carpmael, London. From I.G. Farbenindustrie Akt.-Ges., Frankfort-on-Main, Germany. Application date, September 11, 1929.

340,011. The polyhalogenated fatty acids described in Specification 336,623 (See THE CHEMICAL AGE, Vol. XXIII, p. 578) are treated with aqueous or alcoholic caustic alkalies or ammonia, sodium carbonate, phosphate or acetate, ammonium formate or urea. The halogen atoms are wholly or partly removed with the formation of double bonds, or are wholly or partly replaced by hydroxy groups. Caustic alkalies yield soluble cleansing and emulsifying agents, and weak alkalies yield insoluble products which may be polymerised on boiling with caustic soda, giving products resembling rubber. Examples are given of the treatment of tetrachlorpalmitic acid, pentachloricinoleic acid, hexachlorstearic acid, tetrachloroleic acid and others.

340,012. Polyhalogenated fatty acids containing more than 8 carbon atoms in the molecule or their esters or amides or conversion products still containing halogen, are treated with solutions of sulphides or polysulphides, so that the halogens are partly replaced by mercapts and hydroxy groups and partly split off with the formation of double bonds. The treatment of acids such as those mentioned in specification 340,011 above is described. The products yield salts on being salted out, which are typical sulphonated soaps.

Specifications Accepted with Date of Application

343,441. Catalyst carriers. L. F. Nickell. August 8, 1929.

343,444. Compounds of the anthraquinone series, Manufacture of. British Celanese, Ltd, G. H. Ellis, H. C. Olpin and E. W. Kirk. November 15, 1929.

343,449. Anthraquinone derivatives, Production of. R. J. Loveluck, R. F. Thomson, J. Thomas and Scottish Dyes, Ltd. August 9, 1929.

343,461. Formaldehyhe from methane, Production of. Gutehoffnungshutte Oberhausen Akt.-Ges. November 15, 1928.

343,464. Steel alloys. F. Krupp Akt.-Ges. December 20, 1928.

343,477. Carbon and hydrogen chloride, Production of. J. P. Baxter and Imperial Chemical Industries, Ltd. October 10, 1929.

343,493. Removal of ammonia and sulphuretted hydrogen from gases, Process and apparatus for. C. J. Hansen. January 10, 1929.

343,502. Dyestuffs, Manufacture of. British Celanese, Ltd., G. H. Ellis, H. C. Olpin and D. H. Mosby. September 16, 1929.

343,521. Cellulose ethers, Manufacture of. H. Dreyfus. November 20, 1929.

343,530. Sulphonic acids, Production of. S. Pilat and J. Sereda. July 1, 1929.

343,524. Wetting, cleansing and dispersing agents, Production of. J. Y. Johnson. (*I.G. Farbenindustrie Akt.-Ges.*) August 7, 1929.

343,533. Sulphurised fatty-oil products, Manufacture of—and of emulsions therefrom. Imperial Chemical Industries, Ltd., H. M. Bunbury and R. B. F. F. Clarke. October 14, 1929.

343,553. Crystallisation, Process of. E. Holland Merten. November 19, 1929.

343,569. Metallic compounds of the thiazole series, Manufacture of. A. Carpmael. (*I.G. Farbenindustrie Akt.-Ges.*) November 21, 1929.

343,570. N-dialkyl amino-alkylamino-aldehydes and derivatives thereof, Manufacture of. I.G. Farbenindustrie Akt.-Ges, November 21, 1929. Addition to 288,972.

343,577. Amidines, Manufacture of. Boots Pure Drug Co., Ltd., F. B. Pyman and A. P. T. Easson. November 22, 1929.
343,618. Spongy iron from iron ores, Process and apparatus for the production of. F. Krupp Akt.-Ges. Friedrich Alfred Hutte. September 20, 1929. Addition to 340,641.
343,636. Double salts of calcium nitrate, Manufacture of. Lonza Elektrizitätswerke und Chemische Fabriken Akt.-Ges. December 31, 1928.
343,655. Esters of cellulose or of its transformation products or of other carbohydrates, Manufacture of. I.G. Farbenindustrie Akt.-Ges. December 20, 1928. Addition to 301,036.
343,676. Carbon, Production of. J. P. Baxter and Imperial Chemical Industries, Ltd. January 7, 1930.
343,683. Phosphoric acids and gaseous mixtures suitable for the synthesis of ammonia, Manufacture of. Soc. d'Etudes Scientifiques et d'Entreprises Industrielle. January 9, 1929.
343,685. Electro-depositing on aluminium and aluminium alloys. H. Sutton and H. C. Cocks. January 10, 1930.
343,691. Potassium sulphate and soda, Production of. Chemieverfahren Ges. March 5, 1929.
343,700. Alloy steels, Manufacture of. C. Arnold. January 21, 1930.
343,701. Solutions obtained in leaching phosphate rock with nitric acid and ammonium sulphate, Method of treating. Kunstdunger Patent-Verwertungse Akt.-Ges. November 28, 1929.
343,712. Organic acid esters of cellulose, Production of. L. Clement and C. Riviere. January 31, 1930.
343,744. Benzimidazolone stibinic acids, Manufacture of. I.G. Farbenindustrie Akt.-Ges. March 30, 1929. Addition to 343,072.
343,745. Iron alloys. W. E. Dennison. February 19, 1930.
343,748. Cellulose derivatives, Manufacture of. Soc. of Chemical Industry in Basle. June 1, 1929.
343,785. Aluminium chloride, Manufacture of—and apparatus therefor. Imperial Chemical Industries, Ltd., J. W. Pritchard and D. F. Douse. March 21, 1930.
343,796. Potassium nitrate, Production of. Kali-Forschungs-Anstalt-Ges. April 19, 1929.
343,807. Synthesising organic compounds containing oxygen. Soc. Chimique de la Grande-Paroisse-Azote et Produits Chimiques. February 7, 1930.
343,829. Alkali phosphates, Production of. Metallges Akt.-Ges. February 1, 1930.

Applications for Patents

[In the case of applications for patents under the International Convention, the priority date (that is, the original application date abroad which the applicant desires shall be accorded to the patent) is given in brackets, with the name of the country of origin. Specifications of such applications are open to inspection at the Patent Office on the anniversary of the date given in brackets, whether or not they have been accepted.]

Albright and Wilson, Ltd. Porous articles consisting of silica. 7,034. March 6.
—— Electric heating devices. 7,035. March 6.
American Chemical Paint. Co. Preparation of metals for painting. 6,945. March 5. (United States, March 12, 1930.)
Anglo-Persian Oil Co., Ltd. Refining hydrocarbon liquids. 6,786. March 4.
Ashcroft, E. A. Production and recovery of metal salts, etc. 6,734. March 4.
Blackshaw, H., Coffey, S., Imperial Chemical Industries, Ltd., and Palmer, K. W. Azo dyestuffs, etc. 6,455. March 2.
Caro, N., and Frank, A. R. Cooling reaction zone and preventing explosions in catalytic oxidation of ammonia. 6,617. March 3. (Germany, March 3, 1930.)
Carpmael, A., and I.G. Farbenindustrie Akt.-Ges. Manufacture of adhesive materials. 6,601. March 3.
—— Manufacture of mono- and dicarboxylic acids of the diphenyl series. 6,602. March 3.
—— Manufacture of artificial resins. 6,744. March 4.
—— Manufacture of sulphonation products. 6,745. March 4.
—— Manufacture of ethers. 6,746. March 4.
—— Manufacture of ketones of the anthraquinone series. 6,919. March 5.
—— Manufacture of stable preparations of hormone. 7,159. March 7.
Cellulose Acetate Silk Co., Ltd., and Hayes, D. Method of condensing polyhydric alcohols. 6,758. March 4.
Chemische Fabrik vorm. Sandoz. Preparation of blue, etc. sulphurised dyestuffs. 7,071. March 6. (Germany, March 8, 1930.)
Coffey, S, Imperial Chemical Industries, Ltd. and Palmer, K. W. Manufacture of nitro-amino-diphenyl derivatives. 6,453. March 2.
Du Pont de Nemours and Co., E. I. Polymerisation of vinyl compounds. 6,452. March 2. (United States, March 1, 1930.)
—— Coating-compositions. 6,708. March 4. (United States, March 4, 1930.)
Freeman, H. Process of making iron oxide and sulphur dioxide from iron sulphide ores. 6,680. March 4. (United States, March 5, 1930.)
Groves, W. W., and I.G. Farbenindustrie Akt.-Ges. Manufacture of aldehyde, etc. 6,582. March 3.
I.G. Farbenindustrie Akt.-Ges. and Johnson, J. Y. Manufacture of alkali metal cyanates, etc. 6,483. March 2.
—— Manufacture of styrene, etc. 6,484. March 2.
I.G. Farbenindustrie Akt.-Ges. Manufacture of aldehyde, etc. 6,582. March 3.
—— Manufacture of artificial threads, etc. 6,434. March 2. (Germany, March 1, 1930.)
—— Manufacture of viscose, etc. 6,435. March 2. (Germany, March 1, 1930.)
—— Manufacture of artificial fibres. 7,036. March 6. (Germany, March 6, 1930.)
Imperial Chemical Industries, Ltd. Manufacture of insulating-compositions. 6,454. March 2.
Kane, T. and Strange, E. H. Hydrolysis of alkyl chlorides, etc. 7,141. March 7.
Morgan, G. T. and Walls, L. P. Preparation of homologues and derivatives of phenanthridine. 6,426. March 2.
Rubber Service Laboratories Co. Vulcanisation of rubber. 6,785. March 4. (United States, March 6, 1930.)

Manchester as an Industrial Centre

A VERY fine piece of municipal publicity has just emanated from Manchester, and takes the form of companion "gold" and "silver" books, setting forth the advantages of Manchester for the development of new industries and its claim to be the industrial centre of the world. The "silver" book confines its appeal to fine aero-photographs reproduced in photogravure, with plans and diagrams showing at a glance the obvious advantages of Trafford Park in answering the question "Where should my factory be?" The descriptive text is arranged to face the aero views, each page dealing with one main subject of interest to enterprising manufacturers without any waste of words. At the end of the book the amenities of the Manchester district are set forth and illustrated with seven photographs of the pastoral and historic beauty to be found quite near to the city.

The second book is divided into sections, dealing succinctly with Manchester, Britain's industrial centre, distribution, industrial needs, Manchester's commerce, the human factor, and has some illuminating tables showing the comparative cost of distribution of goods from Manchester and London.

The books can be obtained from the Information Bureau, Estate Office, Trafford Park, Manchester.

Tunisian Phosphate Company

THE Société des Phosphates Tunisiens considerably increased its production during 1930. The output of phosphate rock during the first 11 months of 1930 amounted to 448,369 metric tons, an increase of about 100,000 tons over the preceding year. Deliveries during the same period were 67,000 tons larger than in 1929. The company's plant at Soulom, in the Pyrenees, during the 11-month period, produced 7,804 tons of ammonia (5,808 tons in 1929), and 25,326 tons of calcium nitrate (20,331 tons in 1929). The plant at Pierrefitte, in spite of the difficulties which attended its opening, produced 6,178 tons of phosphoric acid (1,381 tons in 1929), and 11,802 tons of ammonium phosphate (590 tons in 1929). The company is finding a ready market for its production of calcium nitrate, but is apparently finding some difficulty in disposing of ammonium phosphate. This is accounted for by the fact that the latter product is new, and additional educational work and advertising will be necessary.

National Institute of Industrial Psychology

THE tenth annual report of the National Institute of Industrial Psychology has just been issued, and contains some remarkable instances of improved methods and achievements in particular industries during 1930. In the aluminium industry the time studies of machine moulding operations made during 1929 have been continued, and it has been found that in almost every process considerable savings could be effected. In one a saving of 95 minutes a day was possible. The report also contains notes on investigations into problems in chemical, dyeing, engineering, and gas works.

Weekly Prices of British Chemical Products

The prices and comments given below respecting British chemical products are based on direct information supplied by the British manufacturers concerned. Unless otherwise qualified, the figures quoted apply to fair quantities, net and naked at makers' works.

General Heavy Chemicals

ACID ACETIC, 40% TECH.—£18 15s. per ton d/d address U.K. in casks.
ACID CHROMIC.—1s. per lb., less 2½% d/d U.K.
ACID HYDROCHLORIC.—Spot, 3s. 9d. to 6s. carboy d/d, according to purity, strength and locality.
ACID NITRIC, 80° Tw.—Spot, £20 to £25 per ton makers' works, according to district and quality.
ACID SULPHURIC.—Average National prices f.o.r. makers' works, with slight variations up and down owing to local considerations; 140° Tw., Crude acid, 60s. per ton. 168° Tw., Arsenical, £5 10s. per ton. 168° Tw., Non-arsenical, £6 15s. per ton.
AMMONIA (ANHYDROUS).—Spot, 10d. per lb., d/d in cylinders.
AMMONIUM BICHROMATE.—8½d. per lb. d/d U.K.
BISULPHITE OF LIME.—£7 10s. per ton, f.o.r. London, packages free.
BLEACHING POWDER, 35/37%.—Spot, £7 19s. per ton d/d station in casks, special terms for contracts.
BORAX, COMMERCIAL.—Crystals, £13 10s. per ton; granulated, £12 10s. per ton; powder, £14 per ton. (Packed in 1 cwt. bags. carriage paid any station in Great Britain. Prices quoted are for one ton lots and upwards).
CALCIUM CHLORIDE (SOLID), 70/75%.—Spot, £4 15s. to £5 5s. per ton d/d station in drums.
CHROMIUM OXIDE.—9d. to 9½d. per lb. according to quantity d/d U.K.
CHROMETAN.—Crystals, 3½d. per lb. Liquor, £18 12s. 6d. per ton d/d U.K.
COPPER SULPHATE.—£25 to £25 10s. per ton.
METHYLATED SPIRIT 61 O.P.—Industrial, 1s. 7d. to 1s. 11d. per gall.; pyridinised industrial, 1s. 9d. to 2s. 1d. per gall.; mineralised, 2s. 8d. to 2s. 11d. per gall. 64 O.P., 1d. extra in all cases. Prices according to quantity.
NICKEL SULPHATE.—£38 per ton d/d.
NICKEL AMMONIA SULPHATE.—£38 per ton d/d.
POTASH CAUSTIC.—£30 to £33 per ton.
POTASSIUM BICHROMATE CRYSTALS AND GRANULAR.—4¼d. per lb. nett d/d U.K., discount according to quantity: ground ½d. per lb. extra.
POTASSIUM CHLORATE.—3¾d. per lb. ex-wharf, London, in cwt. kegs.
POTASSIUM CHROMATE.—8½d. per lb. d/d U.K.
SALAMMONIAC.—Firsts lump, spot, £40 17s. 6d. per ton d/d address in barrels. Chloride of ammonia, £37 to £45 per ton, carr. paid.
SALT CAKE, UNGROUND.—Spot, £3 10s. per ton d/d station in bulk.
SODA ASH, 58%.—Spot, £6 per ton, f.o.r. in bags, special terms for contracts.
SODA CAUSTIC, SOLID, 76/77%.—Spot, £14 10s. per ton, d/d station.
SODA CRYSTALS.—Spot, £5 to £5 5s. per ton, d/d station or ex depot in 2-cwt. bags.
SODIUM ACETATE 97/98%.—£21 per ton.
SODIUM BICARBONATE, REFINED.—Spot, £10 10s. per ton d/d station in bags.
SODIUM BICHROMATE CRYSTALS (CAKE AND POWDER)—3¼d. per lb. nett d/d U.K., discount according to quantity. Anhydrous ¾d. per lb. extra.
SODIUM BISULPHITE POWDER, 60/62%.—£16 10s. per ton delivered 1-cwt. iron drums for home trade.
SODIUM CHLORATE.—2¾d. per lb.
SODIUM CHROMATE.—3¼d. per lb. d/d U.K.
SODIUM NITRITE.—Spot, £19 per ton, d/d station in drums.
SODIUM PHOSPHATE.—£14 10s. per ton, f.o.r. London, casks free.
SODIUM SILICATE, 140° Tw.—Spot, £8 5s. per ton, d/d station returnable drums.
SODIUM SULPHATE (GLAUBER SALTS).—Spot, £4 2s. 6d. per ton, d/d address in bags.
SODIUM SULPHIDE SOLID, 60/62%.—Spot, £10 5s. per ton, d/d station in drums. Crystals—Spot, £7 10s. per ton, d/d station in returnable casks.
SODIUM SULPHITE, PEA CRYSTALS.—Spot, £13 10s. per ton, d/d station in kegs. Commercial—Spot, £9 per ton, d/d station in bags.

Coal Tar Products

ACID CARBOLIC CRYSTALS.—5d. to 6¼d. per lb. Crude 60's 1s. to 1s. 1d. per gall. August/December.
ACID CRESYLIC 99/100.—1s. 9d. to 1s. 10d. per gall. B.P., 3s. 6d. per gall. 97/99.—Refined, 2s. 2d. to 2s. 3d. per gall. Pale, 98%, 1s. 8d. to 1s. 9d. Dark, 1s. 4d. to 1s. 4½d.
ANTHRACENE OIL, STRAINED (GREEN OIL).—4½d. to 4¾d. per gall.
BENZOLE.—Prices at works: Crude, 5½d. to 6½d. per gall.; Standard Motor, 1s. to 1s. 1d. per gall.; Pure, 1s. 5½d. to 1s. 6½d. per gall.
TOLUOLE.—90%, 1s. 8d. to 1s. 9d. per gall. Pure, 1s. 10d. to 1s. 11d. per gall.
XYLOL.—1s. 8d. to 1s. 9d. per gall. Pure, about 1s. 11d. per gall.
CREOSOTE.—Standard specification, for export, 5½d. per gall. f.o.b.; for Home, 4d. per gall. d/d.
NAPHTHA.—Solvent, 90/160, 1s. 3d. per gall. Solvent, 95/160, 1s. 4d. to 1s. 5d. per gall. Solvent, 90/190, 1s. to 1s. 2d. per gall.
NAPHTHALENE.—Purified Crystals, £11 11s. per ton.
PITCH.—Medium soft, 45s. per ton, in bulk at makers' works.
PYRIDINE.—90/140, 3s. 6d. to 3s. 9d. per gall. 90/160, 3s. 3d. to 3s. 6d. per gall. 90/180, 1s. 9d. to 2s. per gall.

Intermediates and Dyes

In the following list of Intermediates delivered prices include packages except where otherwise stated:—

ACID AMIDONAPHTHOL DISULPHO (1-8-2-4).—10s. 9d. per lb.
ACID ANTHRANILIC.—6s. per lb. 100%.
ACID GAMMA.—Spot, 3s. 6d. per lb. 100% d/d buyer's works.
ACID H.—Spot, 2s. 3d. per lb. 100% d/d buyer's works.
ACID NAPHTHIONIC.—1s. 2d. per lb. 100% d/d buyer's works.
ACID NEVILLE AND WINTHER.—Spot, 2s. 6d. per lb. 100% d/d buyer's works.
ACID SULPHANILIC.—Spot, 8½d. per lb. 100% d/d buyer's works.
ANILINE OIL.—Spot, 8½d. per lb., drums extra, d/d buyer's works.
ANILINE SALTS.—Spot, 8½d. per lb. d/d buyer's works, casks free.
BENZALDEHYDE.—Spot, 1s. 8d. per lb., packages extra, d/d buyer's works.
BENZIDINE BASE.—Spot, 2s. 6d. per lb. 100% d/d buyer's works.
BENZOIC ACID.—Spot, 1s. 8½d. per lb. d/d buyer's works.
o-CRESOL 30/31° C.—£2 6s. 5d. per cwt., in 1-ton lots.
m-CRESOL 98/100%.—2s. 9d. per lb., in ton lots.
p-CRESOL 34·5° C.—1s. 9d. per lb., in ton lots.
DICHLORANILINE.—2s. 5d. per lb.
DIMETHYLANILINE.—Spot, 1s. 6d. per lb., packages extra, d/d buyer's works.
DINITROBENZENE.—7½d. per lb.
DINITROCHLORBENZENE.—£74 per ton d/d.
DINITROTOLUENE.—48/50° C., 7d. per lb.; 66/68° C., 7¾d. per lb.
DIPHENYLAMINE.—Spot, 1s. 8d. per lb. d/d buyer s works.
a-NAPHTHOL.—Spot, 1s. 11d. per lb. d/d buyer's works.
B-NAPHTHOL.—Spot, £65 per ton in 1 ton lots, d/d buyer's works.
a-NAPHTHYLAMINE.—Spot, 1s. per lb. d/d buyer's works.
B-NAPHTHYLAMINE.—Spot, 2s. 9d. per lb. d/d buyer's works.
o-NITRANILINE.—5s. 11d. per lb.
m-NITRANILINE.—Spot, 2s. 6d. per lb. d/d buyer's works.
p-NITRANILINE.—Spot, 1s. 8d. per lb. d/d buyer's works.
NITROBENZENE.—Spot, 6½d. per lb., 5-cwt. lots, drums extra, d/d buyer's works.
NITRONAPHTHALENE.—9d. per lb.
R. SALT.—Spot, 2s. per lb. 100% d/d buyer's works.
SODIUM NAPHTHIONATE.—Spot, 1s. 6d. per lb. 100% d/d buyer's works.
o-TOLUIDINE.—Spot, 8d. per lb., drums extra, d/d buyer's works.
p-TOLUIDINE.—Spot, 1s. 6d. per lb. d/d buyer's works.
m-XYLIDINE ACETATE.—3s. 3d. per lb., 100%.

Wood Distillation Products

ACETATE OF LIME.—Brown, £7 10s. per ton. Grey, £12 to £12 10s. per ton. Liquor, 9d. per gall.
ACETONE.—£60 to £62 10s. per ton.
CHARCOAL.—£6 to £9 per ton, according to grade and locality.
IRON LIQUOR.—10d. to 1s. 4d. per gall.
RED LIQUOR.—9d. per gall.
WOOD CREOSOTE.—1s. 9d. per gall., unrefined.
WOOD NAPHTHA, MISCIBLE.—2s. 11d. per gall. Solvent, 3s. 9d. to 4s. per gall.
WOOD TAR.—£4 to £5 per ton.
BROWN SUGAR OF LEAD.—£37 per ton.

Rubber Chemicals

ANTIMONY SULPHIDE.—Golden, 6d. to 1s. 2d. per lb. according to quality; Crimson, 1s. 3d. to 1s. 5d. per lb., according to quality.
ARSENIC SULPHIDE, YELLOW.—1s. 7d. to 1s. 9d. per lb.
BARYTES.—£6 to £7 10s. per ton, according to quality.
CADMIUM SULPHIDE.—4s. 6d. to 5s. per lb.
CARBON BISULPHIDE.—£26 to £28 per ton, according to quantity; drums extra.
CARBON BLACK.—3½d. to 4 1/16d. per lb., ex wharf.
CARBON TETRACHLORIDE.—£40 to £50 per ton, according to quantity. drums extra.
CHROMIUM OXIDE, GREEN.—1s. 2d. per lb.
DIPHENYLGUANIDINE.—2s. 6d. per lb.
INDIARUBBER SUBSTITUTES, WHITE.—4 5/8d. to 5⅛d. per lb.; Dark, 4⅛d. to 4 7/8d. per lb.
LAMP BLACK.—£28 per ton, barrels free.
LITHOPONE, 30%.—£19 to £21 per ton.
SULPHUR.—£9 10s. to £13 per ton, according to quality.
SULPHUR CHLORIDE.—4d. to 7d. per lb., carboys extra.
SULPHUR PRECIP. B.P.—£55 to £60 per ton, according to quantity.

VERMILION, PALE OR DEEP.—6s. 6d.–7s. per lb.
ZINC SULPHIDE.—8d. to 11d. per lb.

Pharmaceutical and Photographic Chemicals

ACETANILIDE.—1s. 4d. per lb. for 1-cwt. lots.
ACID, ACETIC, PURE, 80%.—£37 5s. per ton d/d address U.K. in casks.
ACID, ACETYL SALICYLIC.—2s. 7d. to 2s. 9d. per lb., according to quantity.
ACID, BENZOIC B.P.—1s. 9d. to 1s. 10d. per lb., for synthetic product. Solely ex Gum, 1s. 3d. to 1s. 6d. per oz.; 50-oz. lots, 1s. 3d. per oz.
ACID, BORIC B.P.—Crystal, £31 per ton; powder, £32 per ton; For one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
ACID, CAMPHORIC.—19s. to 21s. per lb.
ACID, CITRIC.—1s. 0¾d. per lb., less 5%.
ACID, GALLIC.—2s. 11d. per lb. for pure crystal, in cwt. lots.
ACID, MOLYBDIC.—5s. 3d. per lb. in ½-cwt. lots. Packages extra. Special prices for quantities and contracts.
ACID, PYROGALLIC, CRYSTALS.—8s. per lb.
ACID, SALICYLIC, B.P. PULV.—1s. 5d. to 1s. 8d. per lb. Technical.—1s. to 1s. 2d. per lb.
ACID, TANNIC B.P.—2s. 8d. to 2s. 10d. per lb.
ACID, TARTARIC.—1s. 0¾d. per lb., less 5%.
AMIDOL.—7s. 6d. to 11s. 3d. per lb., according to quantity.
AMMONIUM BENZOATE.—3s. 9d. per lb.
AMMONIUM CARBONATE B.P.—£36 per ton. Powder, £39 per ton in 5-cwt. casks. Resublimated, 1s. per lb.
AMMONIUM MOLYBDATE.—4s. 9d. per lb. in ½-cwt. lots. Packages extra. Special prices for quantities and contracts.
ARGENT. NITRAS, CRYSTALS.—1s. 1d. per oz.
ATROPHINE SULPHATE.—8s. per oz.
BARBITONE.—5s. 9d. to 6s. per lb.
BISMUTH CARBONATE.—8s. per lb.
BISMUTH CITRATE.—7s. 6d. per lb.
BISMUTH SALICYLATE.—7s. 3d. per lb.
BISMUTH SUBNITRATE.—6s. 6d. per lb.
BISMUTH NITRATE.—Cryst. 5s. per lb.
BISMUTH OXIDE.—9s. 10d. per lb.
BISMUTH SUBCHLORIDE.—9s. 7d. per lb.
BISMUTH SUBGALLATE.—7s. 3d. per lb. Extra and reduced prices for smaller and larger quantities of all bismuth salts respectively.
BISMUTHI ET AMMON LIQUOR.—Cit. B.P. in W. Qts. 1s. 0½d. per lb.; 12 W. Qts. 11½d. per lb.; 36 W. Qts. 11d. per lb. Liquor Bismuth B.P., in W. Qts., 1s. 2d. per lb.; 6 W. Qts., 11½d. per lb.; 12 W. Qts., 10d. per lb.; 36 W. Qts., 9½d. per lb.
BORAX B.P.—Crystal, £21 10s. per ton; powder, £22 per ton; for one-ton lots and upwards. Packed in 1-cwt. bags carriage paid any station in Great Britain.
BROMIDES.—Ammonium, 1s. 9d. per lb.; potassium, 1s. 4½d. per lb.; granular, 1s. 5d. per lb.; sodium, 1s. 7d. per lb. Prices for 1-cwt. lots.
CAFFEIN, PURE.—6s. 6d. per lb.
CAFFEIN CITRAS.—5s. per lb.
CALCIUM LACTATE.—B.P., 1s. to 1s. 6d. per lb., according to quantity.
CAMPHOR.—Refined flowers, 2s. 10d. to 3s. per lb., according to quantity; also special contract prices.
CHLOROFORM.—2s. 3d. to 2s. 7½d. per lb., according to quantity.
EMETINE HYDROCHLORIDE.—58s. 6d. per oz.
EMETINE BISMUTH IODIDE.—33s. per oz.
EPHEDRINE, PURE.—12s. 6d. to 13s. 6d. per oz.
EPHEDRINE HYDROCHLORIDE.—9s 9d. to 10s. 6d. per oz
EPHEDRINE SULPHATE.—9s. 9d. to 10s. 6d. per oz.
ERGOSTEROL.—2s. 6d. per gm.
ETHERS.—S.G. ·730—1s. to 1s. 1d. per lb., according to quantity; other gravities at proportionate prices.
FORMALDEHYDE, 40%.—37s. per cwt., in barrels, ex wharf.
GLUCOSE, MEDICINAL.—1s. 6d. to 2s. per lb. for large quantities.
HEXAMINE.—2s. 3d. to 2s. 6d. per lb.
HOMATROPINE HYDROBROMIDE.—27s. 6d. per oz.
HYDRASTINE HYDROCHLORIDE.—90s. per oz. for small quantities.
HYDROGEN PEROXIDE (12 VOLS.).—1s. 4d. per gallon, f.o.r. makers' works, naked. B.P., 10 vols., 2s. to 2s. 3d. per gall.; 20 vols., 3s. per gall.
HYDROQUINONE.—3s. 9d. to 4s. per lb., in cwt. lots.
HYPOPHOSPHITES.—Calcium, 2s. 11d. to 3s. 4d. per lb.; potassium, 3s. 2d. to 3s. 7d. per lb.; sodium, 3s. 1d. to 3s. 6d. per lb.; for 28-lb. lots.
IRON AMMONIUM CITRATE.—B.P., 1s. 11d. per lb., for 28-lb. lots. Green, 2s. 6d. per lb., list price. U.S.P., 2s. 9d. per lb. list price.
IRON PERCHLORIDE.—18s. to 20s. per cwt., according to quantity.
IRON QUININE CITRATE.—B.P., 8½d. to 8¾d. per oz., according to quantity.
MAGNESIUM CARBONATE.—Light B.P., 36s. per cwt.
MAGNESIUM OXIDE.—Light Commercial, £62 10s. per ton, less 2½%; Heavy commercial, £21 per ton, less 2½%; in quantity lower; Heavy Pure, 2s. to 2s. 3d. per lb.
MENTHOL.—A.B.R. recrystallised B.P., 14s. per lb. net; Synthetic, 8s. 6d. to 12s. per lb.; Synthetic detached crystals, 8s. 6d. to 10s. per lb., according to quantity; Liquid (95%), 9s. per lb.
MERCURIALS B.P.—Up to 1-cwt. lots, Red Oxide, crystals, 8s. 4d. to 8s. 5d. per lb., levig., 7s. 10d. to 7s. 11d. per lb.; Corrosive Sublimate, Lump, 6s. 7d. to 6s. 8d. per lb., Powder, 6s. to 6s. 1d. per lb.; White Precipitate, Lump, 6s. 9d. to 6s. 10d. per lb., Powder, 6s. 10d. to 6s. 11d. per lb., Extra Fine, 6s. 11d. to 7s. per lb.; Calomel, 7s. 2d. to 7s. 3d. per lb.; Yellow Oxide 7s. 8d. to 7s. 9d. per lb.; Persulph, B.P.C., 6s. 11d. to 7s. per lb.; Sulph. nig., 6s. 8d. to 6s. 9d. per lb. Special prices for larger quantities.
METHYL SALICYLATE.—1s. 3d. to 1s. 5d. per lb.
PARAFORMALDEHYDE.—1s. 8d. per lb.
PARALDEHYDE.—1s. 1d. per lb.
PHENACETIN.—3s. 9d. to 4s. 1d. per lb.
PHENOLPHTHALEIN.—5s. to 5s. 2½d. per lb.
PILOCARPINE NITRATE.—10s. 6d. per oz.
POTASSIUM BITARTRATE 99/100% (Cream of Tartar).—83s. per cwt., less 2½ per cent.
POTASSIUM CITRATE.—B.P., 1s. 9d. per lb. for 28-lb. lots.
POTASSIUM FERRICYANIDE.—1s. 7½d. per lb., in 125-lb. kegs.
POTASSIUM IODIDE.—16s. 8d. to 17s. 9d. per lb., as to quantity.
POTASSIUM METABISULPHITE.—50s. per cwt. d/d London, kegs free.
POTASSIUM PERMANGANATE.—B.P. crystals, 5½d. per lb., spot.
QUININE SULPHATE.—1s. 8d. per oz. for 1,000-oz. lots.
QUINOPHAN.—B.P.C., 14s. 6d. to 16s. 6d. per lb. for cwt. lots.
SACCHARIN.—43s. 6d. per lb.
SALICIN.—18s. 6d. per lb.
SILVER NITRATE.—10d. per oz. for 500-oz. lots, sticks, 2d. per oz. extra.
SODIUM BARBITONUM.—8s. 6d. to 9s. per lb. for 1-cwt. lots.
SODIUM BENZOATE B.P.—1s. 5d. per lb. for 1-cwt. lots.
SODIUM CITRATE.—B.P.C. 1911, 1s. 6d. per lb. B.P.C. 1923, and U.S.P., 1s. 10d. per lb. for 28-lb. lots.
SODIUM HYPOSULPHITE, PHOTOGRAPHIC.—£15 per ton, d/d consignee's station in 1-cwt. kegs.
SODIUM NITROPRUSSIDE.—16s. per lb.
SODIUM POTASSIUM TARTRATE (ROCHELLE SALT).—85s. per cwt. net, ton lots, d/s of 5 cwt. Crystals, 2s. 6d. per cwt. extra.
SODIUM SALICYLATE.—Powder, 1s. 10d. to 2s. 2d. per lb. Crystal, 1s. 11d. to 2s. 3d. per lb.
SODIUM SULPHIDE, PURE RECRYSTALLISED.—10d. to 1s. 2d. per lb.
SODIUM SULPHITE, ANHYDROUS.—£27 10s. to £29 10s. per ton, according to quantity. Delivered U.K.
STRYCHNINE, ALKALOID CRYSTAL, 2s. per oz.; hydrochloride, 1s. 9½d. per oz.; nitrate, 1s. 8d. per oz.; sulphate, 1s. 9d. per oz., for 1,000-oz. quantities.
TARTAR EMETIC, B.P.—Crystal or powder, 1s. 9d. to 2s. per lb.
THYMOL.—Puriss, 6s. to 7s. per lb., according to quantity Natural, 12s. per lb.

Perfumery Chemicals

ACETOPHENONE.—7s. per lb.
AUBEPINE (EX ANETHOL).—9s. per lb.
AMYL ACETATE.—2s. 3d. per lb.
AMYL BUTYRATE.—4s. 9d. per lb.
AMYL CINNAMIC ALDEHYDE.—9s. per lb.
AMYL SALICYLATE.—2s. 6d. per lb.
ANETHOL (M.P. 21/22° C.).—5s. 6d. per lb.
BENZALDEHYDE FREE FROM CHLORINE.—2s. 6d. per lb.
BENZYL ACETATE FROM CHLORINE-FREE BENZYL ALCOHOL.—1s. 9d. per lb.
BENZYL ALCOHOL FREE FROM CHLORINE.—1s. 9d. per lb.
BENZYL BENZOATE.—2s. 4d. per lb.
CINNAMIC ALDEHYDE NATURAL.—11s. 9d. per lb.
COUMARIN.—12s. per lb.
CITRONELLOL.—6s. 6d. per lb.
CITRAL.—6s. 6d. per lb.
ETHYL CINNAMATE.—6s. 9d. per lb.
ETHYL PHTHALATE.—2s. 6d. per lb.
EUGENOL.—8s. 9d. per lb.
GERANIOL.—6s. to 10s. per lb.
HELIOTROPINE.—5s. 9d. per lb.
METHYL ANTHRANILATE.—6s. 3d. per lb.
METHYL BENZOATE.—4s. 3d. per lb.
PHENYL ETHYL ACETATE.—10s. per lb.
PHENYL ETHYL ALCOHOL.—8s. 3d. per lb.
RHODINOL.—38s. 6d. per lb.
SAFROL—1s. 6d. per lb.

Prices of Essential Oils

ANISE OIL.—3s. 3d. per lb.
BERGAMOT OIL.—8s. 6d. per lb.
BOURBON GERANIUM OIL.—14s. per lb.
CAMPHOR OIL.—White, 2s. per lb.; Brown, 1s. 6d. per lb.
CANANGA.—Java, 8s. 3d. per lb.
CASSIA OIL, 80/85%.—4s. 3d. per lb.
CINNAMON OIL LEAF.—5s. per oz.
CITRONELLA OIL.—Java, 2s. 3d. per lb., c.i.f. Pure Ceylon, 2s. 3d. per lb.
CLOVE OIL, 90/92%.—7s. per lb.
EUCALYPTUS OIL, AUSTRALIAN, B.P. 70/75%—1s. 9d. per lb.
LAVENDER OIL.—Mont Blanc, 38/40%, 8s. 6d. per lb.

London Chemical Market

The following notes on the London Chemical Market are specially supplied to* THE CHEMICAL AGE *by Messrs. R. W. Greeff & Co. Ltd., and Messrs. Chas. Page & Co., Ltd., and may be accepted as representing these firms' independent and impartial opinions.

London, March 12, 1931.

THE demand for various chemicals continues to steadily increase with prices generally firm. Export business also continues to show improvement.

General Chemicals

ACETONE.—The demand is satisfactory at £60 to £65 per ton according to quantity.

ACID ACETIC.—Unchanged at £36 5s. to £38 5s. per ton for technical 80%, and £37 5s. to £39 5s. for pure 80%, with a good demand.

ACID CITRIC.—Continues slow at about 1s. 1d. to 1s. 1¾d. per lb., less 5%.

ACID FORMIC.—Firm at about £38 per ton for 85% technical material, and in regular request.

ACID LACTIC.—Steady at £39 to £40 per ton for the 50% by weight pale quality, and in steady demand.

ACID OXALIC.—Firm at £30 7s. 6d. to £32 per ton, according to quantity, and in regular request.

ACID TARTARIC.—The demand is improving somewhat, with prices a little lower at 1s. to 1s. 0¼d. per lb., less 5%.

ALUMINA SULPHATE.—Unchanged at £7 15s. to £8 5s. per ton for the 17/18% iron-free quality.

ARSENIC.—Firm at £19 to £19 10s. per ton.

BARIUM CHLORIDE—In good demand at about £9 10s. to £10 per ton.

CREAM OF TARTAR.—The demand is improving, with prices a little easier at 84s. to 85s. per cwt., ex warehouse.

COPPER SULPHATE.—£22 to £22 10s. per ton, less 5%, free on rails London.

FORMALDEHYDE.—In steady demand at £30 to £30 10s. per ton.

LEAD ACETATE.—Unchanged at £34 5s. per ton for white, with brown at £1 per ton less.

LEAD NITRATE.—Quiet at about £29 10s. per ton.

LITHOPONE.—Steady at £18 to £22 10s. per ton, according to grade and quantity.

POTASSIUM BICHROMATE.—4¼d. per lb., with usual discounts for quantities.

POTASSIUM CHLORATE.—Firm at £28 to £30 per ton.

PERMANGANATE OF POTASH.—Firm at 5¼d. to 5½d. per lb. net, ex wharf London.

SODIUM BICHROMATE.—In steady demand and firm at 3½d. per lb., with usual discounts for contracts.

SODA CHLORATE.—Firm and in good demand at £26 10s. per ton.

SODIUM HYPOSULPHITE.—Photographic crystals is in good request at £14 5s. per ton, commercial quality at about £8 10s. per ton.

SODA YELLOW PRUSSIATE.—Continues firm at 4¾d. to 5½d. per lb., according to quantity.

TARTAR EMETIC.—There is a little improved demand at about 10¾d. to 11d. per lb.

ZINC SULPHATE.—Steady at £11 to £11 10s. per ton.

Coal Tar Products

THERE is no change in the market prices of coal tar products, and although there is more enquiry, actual business is still quiet.

MOTOR BENZOL.—Remains at about 1s. 5½d. to 1s. 6½d. per gallon f.o.r.

SOLVENT NAPHTHA.—Unchanged at about 1s. 2½d. to 1s. 3d. per gallon.

HEAVY NAPHTHA.—Quoted at about 1s. 1d. per gallon f.o.r.

CREOSOTE OIL.—Worth about 3d. to 3½d. per gallon f.o.r. in the North, and about 4d. to 4½d. per gallon in London.

CRESYLIC ACID.—Quoted at about 1s. 8d. per gallon for the 98/100% quality, and at about 1s. 6d. per gallon for the dark quality 95/97%.

NAPHTHALENES.—Obtainable at £3 10s. to £3 15s. per ton for the firelighter quality, at about £4 to £4 5s. per ton for the 74/76 quality, and at about £5 per ton for the 76/78 quality.

PITCH.—Worth about 37s. 6d. to 42s. 6d. per ton, f.o.b. East Coast port.

The following additional prices have been received:—

CARBOLIC ACID.—Business is quiet with prices unchanged—5 ton lots at 5½d., smalls 6¼d., in bulk packing.

ASPIRIN.—Unchanged at 2s. 7d. to 2s. 9d. per lb., according to quantity.

SALICYLIC ACID B.P.—1s. 5d. to 1s. 8d. per lb. Business is quiet.

VANILLIN.—Has been in good demand, and olive oil material is steady at 14s. per lb. in cwt. lots.

METHYL SALICYLATE.—Competition is keen, prices are unchanged at 1s. 3d. to 1s. 5d. per lb.

Nitrogen Fertilisers

Sulphate of Ammonia.—Export.—The market remains quiet with prices unchanged at about £7 per ton f.o.b. U.K. port in single bags, for neutral quality, 20·6 per cent. nitrogen. *Home.*—The recent fall of snow has had a bad effect on the home demand. It is understood that the season will be three or four weeks late this year. Up to the present only small purchases have been made.

Nitrate of Soda.—There is nothing fresh to report.

Latest Oil Prices

LONDON, March 11.—Linseed oil was steady at 2s. 6d. per ton decline for near. Spot, ex mill, £20; March, £18 5s.; April, £18 7s. 6d.; May-August, £19; and September-December, £19 10s., naked. RAPE OIL was steady at decline. Crude extracted, £30 10s.; technical refined, £32, naked, ex wharf. COTTON OIL was firm and 10s. per ton higher. Egyptian crude, £21, refined common edible, £25; and deodorised, £27, naked, ex mill. TURPENTINE was quiet, and 6d. per cwt. lower. American, spot, 40s. 9d.; April, 41s.; and May-June, 41s. 6d.; Russian, spot, £38s.

HULL.—LINSEED OIL.—Spot to April, £18 10s.; May-August, £18 12s. 6d.; September-December, £19 per ton, naked. COTTON OIL.—Egyptian, crude, spot, £20 5s.; edible, refined, spot, £23; technical, spot, £22 15s.; deodorised, £25 per ton. CASTOR OIL.—Pharmacy, spot, 41s. 6d.; first, 36s. 6d.; second, 34s. 6d., per cwt. PALM KERNEL OIL.—Crude, 5½ per cent., spot, £24 10s., per ton, naked. GROUNDNUT OIL.—Crushed-extracted, spot, £25 10s.; deodorised, £29 10s. per ton. SOYA OIL.—Crushed-extracted, spot, £20; deodorised, £23 10s. per ton. RAPE OIL.—Crushed-extracted, spot, £30; refined, £32 per ton. COD OIL.—Nominal, at 19s. per cwt. TURPENTINE, 43s. 9d. per cwt.

South Wales By-Products

SOUTH WALES by-product activities continue to be slow and restricted. There is no improvement in the call for pitch, the big users, especially the patent fuel makers, confining their purchases to small parcels for prompt delivery. There is no change in pitch values. There is a slightly better call for road tar, with values unchanged round about 13s. per 40-gallon barrel delivered. Solvent naphtha has a slow market, while heavy naphtha has practically no call. Quotations are unchanged. Refined tars continue to have a fair and steady call, with quotations unchanged for coke oven and gasworks tar. Motor benzol is in steady and brisk demand. Patent fuel and coke exports are unchanged, and the immediate prospects are not encouraging. Patent fuel prices, for export are:—21s. to 21s. 6d., ex-ship Cardiff; 20s., ex-ship Swansea and Newport. Coke prices are:—Best foundry, 34s. 6d. to 36s. 6d.; good foundry, 22s. 6d. to 25s.; furnace, 16s. 6d. to 17s. 6d.

Scottish Coal Tar Products

THE demand for the higher boiling fractions of tar acids is increasing and, owing to scarcity of the necessary oils, production is much below normal. Other products are quiet.

Cresylic Acid.—Ordinary grades are dull but high co-efficient quality is in good demand. Pale, 99/100%, 1s. 6d. to 1s. 7d. per gallon; pale, 97/99%, 1s. 5d. to 1s. 6d. per gallon; dark, 97/99%, 1s. 4d. to 1s. 5d. per gallon; high boiling, 1s. 8d. to 1s. 9d. per gallon; all f.o.r. in buyers' packages.

Carbolic Sixties.—Value remains nominal at about 1s. 6d. per gallon.

Creosote Oil.—Timber qualities are dull, but grades containing acids are finding a fair market. Specificarion oils, 2¼d. to 3d. per gallon; gas works ordinary, 3½d. to 3¾d. per gallon; washed oil, 3d. to 3¼d. per gallon; all f.o.r. in bulk.

Coal Tar Pitch.—Some export inquiries are in circulation, but value remains easy at 40s. to 42s. 6d. per ton f.a.s. Glasgow for export, and about 42s. 6d. per ton, f.o.r. works for home trade.

Blast Furnace Pitch.—In small demand at controlled prices of 30s. per ton f.o.r. works for home trade, and 35s. per ton f.a.s. Glasgow for export.

Refined Coal Tar.—More business is offering, but quotations remain easy at 2¼d. to 3d. per gallon f.o.r. in buyers' packages.

Blast Furnace Tar.—Dull at 2¾d. per gallon, f.o.r. naked.

Crude Naphtha.—Unchanged at 4¼d. to 4½d. per gallon, ex works in bulk.

Water White Products.—Few orders are being placed. Motor benzol is 1s. 3d. to 1s. 4d. per gallon; 90/160 solvent, 1s. 2d. to 1s. 3d. per gallon; 90/190 heavy solvent, 1s. to 1s. 0½d. per gallon; all f.o.r. works in bulk.

Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE *by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing this firm's independent and impartial opinions.*

Glasgow, March 10, 1931.

INQUIRIES for home trade have been steadily increasing in the Scottish heavy chemical market.

Industrial Chemicals

ACETONE.—B.G.S.—£60 to £63 per ton, ex wharf, according to quantity.

ACID, ACETIC.—Prices ruling are as follows: glacial, 98/100%, £47 to £58 per ton; pure, £37 5s. per ton; technical, 80%, £36 5s., delivered in minimum lots of 1 ton.

ACID, BORIC.—Granulated commercial, £22 per ton; crystals, £23; B.P. crystals, £31 per ton; B.P. powder, £32 per ton, in 1-cwt. bags, delivered Great Britain free in one-ton lots upwards.

ACID, HYDROCHLORIC.—Usual steady demand. Arsenical quality, 4s. per carboy. Dearsenicated quality, 5s. per carboy, ex works, full wagon loads.

ACID, NITRIC, 80° QUALITY.—£23 per ton, ex station, full truck loads.

ACID, OXALIC.—98/100%.—On offer at the same price, viz.: 3¼d. per lb., ex store. On offer from the Continent at 3¼d. per lb., ex wharf.

ACID, SULPHURIC.—£3 7s. 6d. per ton, ex works, for 144° quality; £5 15s. per ton for 168°. Dearsenicated quality, 20s. per ton extra.

ACID, TARTARIC, B.P. CRYSTALS.—Quoted 11¾d. per lb., less 5%, ex wharf. On offer for prompt delivery from the Continent at 1s. per lb., less 5%, ex wharf.

ALUMINA SULPHATE.—Quoted round about £8 10s. per ton, ex store.

ALUM, LUMP POTASH.—Now quoted £8 10s. od. per ton., c.i.f. U.K. ports. Crystal meal, about 2s. 6d. per ton less.

AMMONIA ANHYDROUS.—10¼d. per lb., containers extra and returnable.

AMMONIA CARBONATE.—Lump quality quoted £36 per ton. Powdered, £38 per ton, packed in 5 cwt. casks, delivered U.K. stations or f.o.b. U.K. ports.

AMMONIA LIQUID, 80°.—Unchanged at about 2½d. to 3d. per lb., delivered, according to quantity.

AMMONIA MURIATE.—Grey galvanisers' crystals of British manufacture quoted £21 to £22 per ton, ex station. Fine white crystals offered from the Continent at about £17 5s. per ton, c.i.f. U.K. ports.

ANTIMONY OXIDE.—Spot material obtainable at round about £28 per ton, ex wharf. On offer for shipment from China at about £27 per ton, c.i.f. U.K.

ARSENIC, WHITE POWDERED.—Quoted £22 10s. per ton, ex wharf. Spot material still on offer at £22 15s. per ton, ex store.

BARIUM CHLORIDE.—In good demand and price about £9 10s. per ton, c.i.f. U.K. ports. For Continental materials our price would be £8 10s. per ton, f.o.b. Antwerp or Rotterdam.

BLEACHING POWDER.—British manufacturers' contract price to consumers unchanged at £6 15s. per ton, delivered in minimum 4-ton lots. Continental now offered at about the same figure.

CALCIUM CHLORIDE.—Remains unchanged. British manufacturers' price, £4 15s. to £5 5s. per ton, according to quantity and point of delivery. Continental material on offer at £4 15s. per ton, c.i.f. U.K. ports.

COPPERAS, GREEN.—At about £3 15s. per ton, f.o.r. works, or £4 12s. 6d. per ton, f.o.b. U.K. ports.

FORMALDEHYDE, 40%.—Now quoted £31 per ton, ex store. Continental on offer at about £20 per ton, ex wharf.

GLAUBER SALTS.—English material quoted £4 10s. per ton, ex station. Continental on offer at about £3 per ton, ex wharf.

LEAD, RED.—Price now £34 per ton, delivered buyers' works.

LEAD, WHITE.—Quoted £46 per ton, carriage paid.

LEAD, ACETATE.—White crystals quoted round about £38 to £39 per ton ex wharf. Brown on offer at about £2 per ton less.

MAGNESITE.—GROUND CALCINED.—Quoted £9 7s. 6d. per ton, ex store.

METHYLATED SPIRIT.—Industrial quality 64 o.p. quoted 1s. 8d. per gallon less 2½% delivered.

POTASSIUM BICHROMATE.—Quoted 4¼d. per lb., delivered U.K. or c.i.f. Irish ports, with an allowance for contracts.

POTASSIUM CARBONATE.—Spot material on offer, £25 10s. per ton ex store. Offered from the Continent at £24 15s. per ton, c.i.f. U.K. ports.

POTASSIUM CHLORATE, 99¾/100% POWDER.—Quoted £25 per ton ex store; crystals 30s. per ton extra.

POTASSIUM NITRATE.—Refined granulated quality quoted £20 17s. 6d. per ton, c.i.f. U.K. ports. Spot material on offer at about £20 10s. per ton ex store.

POTASSIUM PERMANGANATE B.P. CRYSTALS.—Quoted 5¼d. per lb., ex wharf.

POTASSIUM PRUSSIATE (YELLOW).—Spot material quoted 7d. per lb. ex store. Offered for prompt delivery from the Continent at about 6¾d. per lb. ex wharf.

SODA CAUSTIC.—Powdered 98/99%, £17 10s. per ton in drums, £18 15s. in casks. Solid 76/77% £14 10s. per ton in drums, £14 12s. 6d. per ton for 70/72% in drums, all carriage paid buyer's station, minimum four-ton lots. For contracts 10s. per ton less.

SODIUM BICARBONATE.—Refined recrystallised, £10 10s. per ton, ex quay or station. M.W. quality 30s. per ton less.

SODIUM BICHROMATE.—Quoted 3¾d. per lb., delivered buyer's premises, with concession for contracts.

SODIUM CARBONATE (SODA CRYSTALS).—£5 to £5 5s. per ton, ex quay or station; powdered or pea quality, 7s. 6d. per ton extra. Light soda ash, £7 13s. per ton, ex quay, minimum four-ton lots, with various reductions for contracts.

SODIUM HYPOSULPHITE.—Large crystals of English manufacture quoted £9 2s. 6d. per ton, ex station, minimum four-ton lots. Pea crystals on offer at £15 per ton, ex station, minimum four-ton lots.

SODIUM NITRATE.—Chilean producers now offer at £10 per ton, carriage paid, buyer's sidings, minimum six-ton lots.

SODIUM PRUSSIATE.—Quoted 5¼d. per lb., ex store. On offer at 5d. per lb., ex wharf, to come forward.

SODIUM SULPHATE (SALTCAKE).—Price, 60s. per ton, ex works; 65s. per ton, delivered for unground quality. Ground quality 2s. 6d. per ton extra.

SODIUM SULPHIDE.—Prices for home consumption: solid 61/62%, £10 per ton; broken, 60/62%, £11 per ton; crystals 30/32%, £8 2s. 6d. per ton, delivered buyers' works on contract, minimum four-ton lots. Special prices for some consumers. Spot material 5s. per ton extra.

SULPHUR.—Flowers, £12 per ton; roll, £10 10s. per ton; rock, £9 5s. per ton; ground American, £9 per ton, ex store.

ZINC CHLORIDE 98%.—British material now offered at round about £19 per ton, f.o.b. U.K. ports.

ZINC SULPHATE.—Quoted £11 per ton, ex wharf.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

British Association of Chemists

THE Manchester Section of the British Association of Chemists have accepted the invitation of the Manchester Literary and Philosophical Society to a special meeting of the Society on Tuesday, March 17, 1931—the 150th anniversary of the Society's foundation. The meeting will be held in the Manchester Athenæum (George Street entrance) at 4 p.m. when Sir J. Joseph Thomson will deliver the Dalton Lecture and will receive the Dalton Medal for eminent services to science. The title of the lecture will be "Atoms and Electrons."

The Manchester Section of the Society of Dyers and Colourists and the British Association of Chemists invite members to a meeting on April 17, 1931, at 36, George Street, Manchester, when a paper will be given by Mr. H. E. Potts, M.Sc., dealing with the Patent Law in relation to the chemist and technologist.

Paints and Varnishes in Yugoslavia

THE paint and varnish industry of Yugoslavia is progressing and with the protection of a strong import tariff on paint products, imports are diminishing and domestic production advancing, writes the U.S. Commercial Attaché at Belgrade. Germany was the leader in the Yugoslavia import trade, but although that country still maintains the dominating position in some lines, trade has fallen off. There are five or six important domestic manufacturers of paints and varnishes, most of which are capitalised or controlled by foreign industries. During 1929, imports of paints into Yugoslavia totalled 382,518 kilos, valued at 10,737,086 dinars. The chief countries supplying the imports were Austria—156,777 kilos, value 4,214,237 dinars; Germany—92,750 kilos, value 3,279,122 dinars; and Czechoslavia—52,195 kilos, value 916,290 dinars. Spirit varnishes imported during the same year amounted to 9,656 kilos, having a value of 339,694 dinars. Austria sent over 50 per cent. of the total, followed by the United States and Germany. Imports of oil varnishes reached 78,725 kilos, valued at 2,598,167 dinars, of which Austria furnished about 40 per cent., Germany approximately 35 per cent., and the United States 20 per cent.

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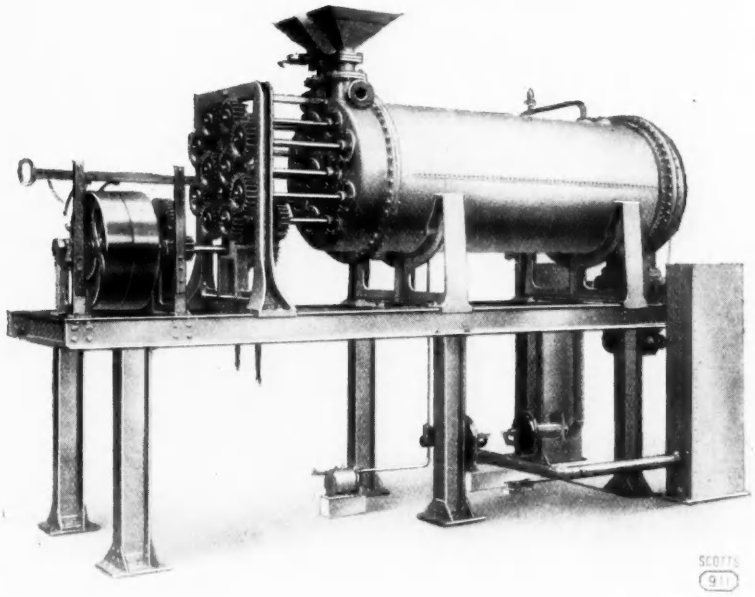

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Manchester Chemical Market

[From Our Own Correspondent.]

Manchester, March 12, 1931.

A satisfactory feature of the chemical market is that the vast majority of lines continue to show remarkable steadiness, and it is only in very rare instances that anything resembling weakness is in evidence. Up to the present, however, although there has been a tendency during the past week, not only in chemicals, but in most of the other principal markets here, to take a somewhat brighter view of early trade prospects, there has not been much real improvement in the general position, though some traders report having dealt with a rather larger number of inquiries which may result in an increase of business.

Heavy Chemicals

There is a quietly steady trade going through in bichromate of soda, values of which are well held at 3½d. per lb., less discounts of from 1 to 2½ per cent., according to quantity. Alkali meets with a moderate inquiry and offers are firm at £6 per ton, in contracts. The demand for prussiate of soda this week has been on rather quiet lines but prices are maintained at from 6¾d. to 7¼d. per lb., according to quantity. Sales of sulphide of sodium are of limited extent but there has been little quotable change in prices, the 60-65 per cent. concentrated solid material being offered at round £9 10s. per ton and the commercial at £8. Saltcake is steady at about £3 per ton, although inquiry in this section continues moderate. Bicarbonate of soda is held on the contract basis of £10 10s. per ton and a quiet steady demand is reported. Deliveries of caustic soda keep up fairly well and prices are firm at from £12 15s. to £14 per ton, in contracts, and according to grade. Sales of chlorate of soda are on the quiet side, but at about £26 10s. per ton, values are the same as before. Phosphate of soda meets with a moderate inquiry, with the dibasic sort on offer at round £10 per ton. Hyposulphite of soda is a steady section, the photographic grade being quoted at up to £15 10s. per ton, and the commercial quality at round £9.

Most of the potash materials continue very steady. Bichromate is moving in moderate quantities, with offers on the basis of 4¼d. per lb., less 1 to 2½ per cent. There is a quiet demand about in the case of yellow prussiate of potash but at 6¾d. to 7¼d. per lb., according to quantity, prices are fully maintained. The demand for permanganate of potash is about up to its recent moderate level, with the commercial quality selling at about 5¼d. per lb., and the B.P. at 5½d. Fair sales are reported of carbonate of potash at round £25 5s. per ton, and also of caustic at from £28 10s. to £29. Moderate interest is being shown in chlorate of potash, quotations for which are steady at about £27 10s. per ton.

The demand for arsenic is on somewhat quiet lines, but offers of this material are still in the neighbourhood of £19 per ton, at the mines, for white powdered, Cornish makes. Sales of sulphate of copper are only moderately active and supplies are now obtainable at from £20 to £21 per ton, f.o.b. The acetates of lead are quiet but there has been no further change in prices, the white and brown grades being quoted at £33 17s. 6d. to £35 15s. and £33 10s. to £34 15s. respectively; nitrate is rather easy at from £29 to £29 10s. per ton. Grey acetate of lime is currently quoted at round £13 per ton, with the brown grade at £7 5s.

Acids and Tar Products

Citric acid buyers are cautious in view of the easy tendency now being displayed, offers being down to about 1s. 1¼d. per lb. Tartaric acid is likewise quiet at 11¼d. per lb. Acetic acid is moving in fair quantities and values are firm at round £37 per ton for the 80 per cent. commercial quality, and from £51 per ton for the technical glacial. Oxalic acid is slow but unchanged compared with a week ago at £1 12s. per cwt., ex store.

Pitch prices are rather uncertain and at 37s. 6d. to 40s. per ton, f.o.b., sales are only moderate. There has been no further alteration in creosote oil prices, these ranging from about 3d. to 4d. per gallon, at works, according to quality. A quiet business is being done in solvent naphtha at about 1s. 1½d. per gallon, at works. Crude carbolic acid is steady at 1s. 2d. per gallon for 60's, with crystals at about 5¼d. per lb., f.o.b.

Company News

United Glass Bottle Manufacturers, Ltd.—The directors have recommended a final ordinary dividend of 5 per cent., less tax, making 7½ per cent. for the year ended December 31, 1930.

British Portland Cement Manufacturers, Ltd.—After providing for sinking funds, and for depreciation reserves, a final dividend of 10 per cent., less tax, is recommended on the ordinary shares, making 15 per cent. for 1930.

Associated Portland Cement Manufacturers, Ltd.—Subject to final audit, the directors recommend, after providing for sinking funds, and for depreciation reserves, the payment of a dividend of 8 per cent., less tax, on the ordinary shares in respect of the year 1930.

Dominion Tar and Chemical Co.—The results for the year 1930 show a profit, before depreciation, of $681,683. To depreciation is placed $500,380, debenture interest $286,331, preferred dividends $327,275. The available total of $439,368 for common shares is carried to surplus, which is now $991,046.

Drug Incorporated of America.—Net earnings for 1930, it is reported, amounted to $21,130,698, against $17,013,543 for the previous year. The figures for the year 1930 include earnings of Household Products, Inc., and Vick Chemical Co., acquired during the year, as if they had been owned for the full period.

Tehidy Minerals, Ltd.—For the year ended December 31, 1930, the profit amounted to £8,035, to which is added the balance brought forward of £9,384. The directors have decided to place to reserve against investments £5,000, and recommend the payment of a dividend for 1930 of 2½ per cent., less tax, leaving a credit balance of £5,069 to be carried forward.

Canadian Industries, Ltd.—The report for 1930 shows that the total gross sales, after eliminating those representing activities in which the company was not engaged in 1929, decreased by 12 per cent. The net operating profit declined by almost 25 per cent., the new operating units generally speaking not having been completed in time to contribute materially towards earnings. Total dividends of $5 per share were paid on the common stock, against $5.50 in 1929, leaving the surplus at December 31, 1930, at $12,400,966, against $12,342,879 at January 1, 1930.

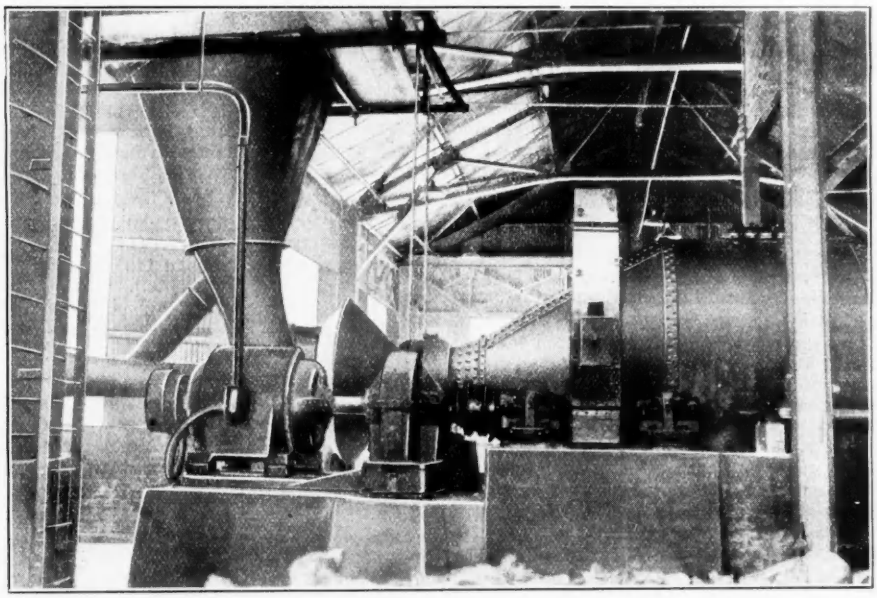
Southall Brothers and Barclay, Ltd.—The report for 1930 states that accounts show, after providing for tax, directors' remuneration, depreciation and bad debts, a cash bonus of £5,200 to employees, and £2,750 to pension fund, a balance of profit of £68,216, to which is added £21,384 brought forward, making £89,600. The dividend on the ordinary shares at the rate of 12½ per cent. per annum, tax free (less interim of 5 per cent. paid October 1), absorbs £9,750, and bonus of 1s. 6d. per share on the ordinary shares, tax free, £9,750. To reserve is placed £30,000, leaving a balance to be carried forward of £27,100.

Tariff Changes

Argentine.—As from February 23, zinc oxide and petroleum and certain residues are now excluded from the duty-free list, and will pay a 5 per cent. *ad val.* duty.

Egypt.—A Royal decree operative from February 17 has modified the import duties under a number of headings. Chemicals affected include: Chloride of lime, now 40 millièmes per 100 kilogs. (formerly 60 millièmes), celluloid, bakelite and other artificial organic plastic materials, 20 millièmes per kilog. (formerly 10 per cent. *ad val.*), mineral colours and pigments, 400 millièmes for 100 kilogs. (12 per cent. *ad val.*); ochres and other colouring earths, 150 millièmes per 100 kilogs (15 per cent. *ad val.*); colours with a base of chalk, of sulphate of baryta or of other products, coloured with aniline or mineral pigments, 400 mill. per 100 kilogs. (12 per cent. *ad val.*); colours with base of other materials, not elsewhere mentioned, 400 mill. per 100 kilogs. (new); varnishes, lacs and siccatives, 15 per cent. *ad val.* (12 per cent. *ad val.*); hard soap, 650 mill. (550 mill.); animal and vegetable oils or greases and fatty acids partially saponified and Turkey-red oil, 250 mill. per 100 kilogs. (8 per cent. *ad val.*).

DO YOUR GRINDING COSTS CUT INTO PROFITS?



HARDINGE Mills have proved by years of hard service that for heavy duty grinding they are unequalled for low cost of operation and negligible maintenance charges. They are economical in power consumption, floor space and head room, have an exceptional capacity per unit, possess great structural strength and rigidity and can be changed from wet to dry grinding merely by changing the type of feeder.

ANOTHER LARGE ORDER

We have just received the following order for Hardinge Conical Mills complete with air classifying equipment:

Number: 16 Mills, Ball Type.
Size: 10 ft. × 60 in. cylinder.
Capacity:
10 tons per hr. each to 92%-180 mesh.
Material: Anthracite. Moisture: 10%.

Complete information and data on the Hardinge Conical Mill will be sent on request to the Sales Manager, Dept. C.A., Mining and Industrial Equipment Ltd.,
11, Southampton Row, W.C.1.

THE HARDINGE MILL

MINING & INDUSTRIAL EQUIPMENT LTD
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Claim Against Cellulose Acetate Silk Co.

Judgment Reserved

In the King's Bench Division on Wednesday, Mr. Justice Wright reserved judgment in the action which has been brought by the Widnes Foundry (1925), Ltd., of Lugdale Road, Widnes, against the Cellulose Acetate Silk Co., Ltd., of Lancaster, claiming a balance of £8,000 on a contract for £19,750 for the erection of acetone recovery plant, to be used in the manufacture of artificial silk. In the contract there was a clause under which if the work was not completed within eighteen working weeks plaintiffs were to pay £20 a week for thirty weeks in the event of any delay. The Cellulose Co. counter-claimed for about £14,000 damages for seventeen weeks alleged delay. Plaintiffs admitted some delay, but said they were only liable under the penalty mentioned.

Mr. Samuel Wright, manager of plaintiff's chemical department, giving evidence, admitted that the work for the plant was hindered from the start by bad weather and other unavoidable matters. The reason his firm could not complete the erection within the contract period of eighteen working weeks was that the time was under-estimated.

Mr. Wright, answering Serjeant Sullivan, said the recovery plant plaintiffs were to erect was to act in conjunction with the defendants' spinning plant, and if the latter was working without the recovery machinery a loss of acetone would result. At that time acetone was worth £76 per ton. He denied that the work on the defenders' plant was postponed because of other urgent contracts his firm had.

For the defence, Mr. Phillibert Camille Chaumerton, works manager to the Cellulose Co., gave evidence of discussing the contract for the recovery plant in eighteen working weeks by the plaintiff company, at the same time pointing out the importance of completion in that period. There was considerable delay, and complaint was made. The plaintiffs' explanation was that the delay was due to another large order the firm had in hand. Mention of the £20 a week penalty was made, but, said Mr. Chaumerton, he pointed out that that sum would not cover the serious loss of acceptance suffered owing to the recovery plant not being ready for use.

Chemical Trade Inquiries

These inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Australia.—A Sydney firm wishes to represent British exporters of raw materials, including accelerators for the rubber industry. (Ref. No. 175.)

British India.—A commission agent, who is also an import and export merchant, in Bombay, desires to obtain the representation of manufacturers of aluminium and other metals, coal tar, pitch, lump alum, cement, rosin, sal-ammoniac, and sulphate of copper for Bombay and the Bombay Presidency. (Ref. No. 176.)

Germany.—An agent in Berlin wishes to represent British manufacturers of chemicals—synthetic solid products, acetic acid, acetone, solvents, dyes, and fine chemicals. (Ref. No. 186.)

Holland.—The representation of British manufacturers of lubricating oils is sought by a company in Amsterdam. (Ref. No. 188.)

South Africa.—The South African Railways and Harbours Administration is calling for tenders to be presented in Johannesburg by March 23, for the supply of 160 tons of creosote. (Ref. No. F.X. 1,052.)

"C.A." Queries

We receive so many inquiries from readers as to technical, industrial, and other points, that we have decided to make a selection for publication. In cases where the answers are of general interest, they will be published; in others, the answers will simply be passed on to the inquirers. Readers are invited to supply information on the subjects of the queries:—

163. (*Chemical Plant*).—A London firm require for shipment to India a small plant for producing Ether and Chloroform from Ethyl Alcohol at the rate of 5 gallons in eight hours.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.*]

APSLEE CO., LTD., Manchester, manufacturers of drugs, etc. (M., 14/3/31.) Reg. February 24, £250 deb., to W. P. Miller, 245, Upper Brook Street, Manchester; general charge. *Nil. May 5, 1930.

CASEIN (INDUSTRIES), LTD., London, S.W. (M., 14/3/31.) Reg. February 28, charge to Barclays Bank, Ltd., securing all moneys due or to become due to the Bank; charged on Culvert Works, Sheepcote Lane, and 46, Brougham Street, Battersea. *Nil. September 17, 1930.

TRAGASOL PRODUCTS LTD. (late GUM TRAGASOL SUPPLY CO., LTD.), Hooton. (M., 14/3/31.) Reg. February 20, series of £10,000 debs. present issue £7,000; general charge (subject, etc.). *Nil. December 16, 1930.

WILLIAMSON'S (SIR HEDWORTH) LIMEWORKS, LTD. (late SIR HEDWORTH WILLIAMSON'S FULWELL LIME WORKS, LTD.), Sunderland. (M., 14/3/31.) Reg. February 26, series of £5,000 debs. present issue £3,600; general charge. *£15,000. July 10, 1930.

London Gazette, &c.

Company Winding Up Voluntarily

SILICA COKE OVEN AND MACHINERY, LTD. (C.W.U.V., 14/3/31.) Creditors' claims to Henry C. McAlliste r of 59–69, Broad Street Avenue, London, E.C.2, the liquidator of the company, by March 31.

New Companies Registered

I. ALEXANDER, LTD., 209, London Road, Liverpool. Registered March 10. Nominal capital, £100 in £1 shares. Chemists, druggists, drysalters, oil and colour men, etc.

THE NATIONAL FIRE PROTECTION CO., LTD., 20, Bedford Street, Strand, London, W.C.2 Registered as a "public" company on March 5. Nominal capital, £20,000, in 175,000 ordinary shares of 2s., and 50,000 founders' shares of 1s. each. Manufacturers, importers and exporters of and dealers in fire extinguishers and appliances for the prevention and extinction of fire and for the protection of life and property from loss or damage caused by fire, etc. Directors: Major Claude M. B. Hamilton, R. H. Sansome.

The Salt Industry in Canada

The Mines Branch of the Department of Mines at Ottawa has just forwarded to the office of the High Commissioner for Canada in London copies of a new Report (No. 716) by L. Heber Cole, dealing with "The Salt Industry in Canada." This volume takes the place of a former treatise by Mr. Cole which was published by the Department during the war, since which time a number of new deposits have been discovered and extensive development made in the industry.

The increasing use of salt in Canada for the manufacture of chemicals has in recent years caused a rapid rise in production, and there is every reason to look forward to the expansion of the industry. Among the principal new developments are the opening-up of the Malagash deposits in Nova Scotia and the discovery of rock salt at McMurray in northern Alberta. Copies of the Report can be obtained by firms interested on application either to the Secretary, Office of the High Commissioner for Canada, Canada House, Trafalgar Square, London, S.W.1, or to the Director, Mines Branch, Department of Mines, Ottawa, Canada.